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Contractors and Engineers Monthly

Vol. 35, No. 2 FEBRUARY, 1938 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

- **Three-Way Financing**
  "Believe It or Not," said Ripley about WPA and PWA getting together to help Birmingham, Ala., build the big rock-fill dam for its new industrial water supply. Each posted the job, as shown on page 44.
  See page 2.
- **Pea-Soup Levees Hold Water**
  Hydraulic levees of "pea soup and coffee grounds," built without dikes, are rising in the Atchafalaya Basin, La., where materials must be used as found.
  See page 2.
- **Stabilized Road Bases**
  Experimental base sections stabilized with different binders and aggregate mixed by machine and topped with an armor coat of pea gravel on a 13-mile project in Missouri.
  See page 2.
- **Biggest Road Show Ever**
  Paragraphs on the A. R. B. A. Five-Star Road Show in Cleveland, as viewed by the Editor.
  See page 6.
- **Snow Removal Problems**
  The topographical and climatic problems in Idaho and how they are overcome in its winter maintenance program.
  See page 12.
- **Precast-Slab Underpass**
  The grand finale of an unusual underpass job in New Hampshire, involving grading, concrete abutments and underpinning of a single-track railroad line, was the swinging of the two 108-ton precast slabs into place.
  See page 21.
- **Equipment for 1938**
  Descriptions of new construction equipment, announced early this year, and much of it exhibited at the A. R. B. A. Road Show in January, will be found throughout this and following issues and, because of many new developments, are worthy of particular attention.

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Ice and High Water Don't Bother Road-Mix

Lawrence County, Ill., Completes First Contract for Road-Mix Which Stands Test of Traffic and Ice While Under Water

✦ LAWRENCE COUNTY, ILL., right on the eastern edge of the state, tackled its first road-mix contract in the fall of 1936 with results that have been a source of pride to all concerned. Lawrenceville, the county seat, is only 9 miles from Vincennes, Ind., and between the two lies the Wabash River and also Lake Lawrence, a man-made lake of 38 acres which has become a small summer resort for many residents of the two communities. The construction fraternity will be interested in the reason for the creation of the lake. It was not just "promoted" by building a small concrete or earth dam and selling building lots on its shores. It is one of the old gravel pits opened originally by the Baltimore & Ohio Railroad for ballasting its line between Cincinnati and St. Louis. When the pit was not used and continually pumped out, it filled with clear water and has maintained a level generally the same as the nearby Wabash River.

The lake was the reason for the construction of the black-top road. Traffic became so heavy and the road in such bad shape and exceedingly dusty that it was thought best to improve it. A contract was let late in the summer and work actually started August 7, 1936. The loose gravel on the old road was bladed to the shoulders and the surface primed with MC-1 at the rate of 0.35 gallon per square yard, using Texaco asphalt, a native product, as one of the large Texas Co. refineries is located just south of the county seat. The contractor rented an 1,100-gallon South Bend distributor for the job, priming the road

(*Continued on page 14*)

Twelve Miles in 60 Days Laid by Dual Drum Paver

✦ "FIVE days to the mile is all we need to pave the Conway contract," said E. W. Campbell, Assistant Superintendent, and the story of the job shows that the organization made the prophecy a reality. It needed plenty of thought in organizing the work, a steady supply of hustling batch trucks and a good finishing crew to stand the pace.

Make-Ready on the Grade

The grade for the 12.7 miles of 20-foot concrete pavement with a 9-6-9-inch and 9-7-9-inch cross section and a 1½-inch crown was prepared with a fine accuracy to prevent any delays at the paver. An Allis-Chalmers Model L tractor pulled a 12-foot Caterpillar blade to rough in the fine grade ahead of the forms and then the Ted Carr Formgrader cut the form trenches on both sides so that the form setters could rush the heavy-section steel forms into place. Heltzel 9-inch 5-gage steel forms with a 9-inch base and a 2½-inch top to furnish a firm support for the Flynn Surgrader were set by a crew consisting of a man ahead setting line, three men

A. C. Campbell Constr. Co. Speeds Long Concrete Job Near Little Rock, Ark.

setting the forms, one man and a helper lining up the forms and two men hand-tamping every inch of the base to help the Surgrader sing that well-known hymn, "How Firm a Foundation." The Surgrader carried a ramp for the batch trucks to run over so that the forms did not have to be broken down after the lining up had been completed. All low spots in the grade were filled to the proper cross section and the spots rolled with a 10-ton Huber roller. On a few particularly high spots ahead of the form setting, the Grade Superintendent pulled in the Continental hydraulic scraper and quickly moved the excess dirt.

Batching Set-Ups Were Squeezed

The contractor was not happy at all over the locations he could secure for the batching plants. It was necessary to set up twice for this job because of its length. The first batching set-up was at a small town called Gold Creek, probably because there is no gold there, and the second was at Mayflower, totally devoid of those sweet smelling blossoms. At Gold Creek the plant was located between the main track of the Missouri Pacific and the new highway. There was just room for the cranes, batchers and a stockpile between the road and the track in the Gold Creek set-up and it was necessary for the cranes to unload across the main track. A constant watch was kept for trains and the complete schedule was posted.

At Mayflower the plant was located between a spur track and the old highway. The area was very limited and trucks were required to back in from the highway. Two flagmen were used to protect the trucks and the public traffic from one another.

Crushed stone and sand was supplied

(*Continued on page 24*)

PRECAST-SLAB BRIDGE SUCCESSFULLY INSTALLED

U. S. B. P. R. Photo

Unique Structure in Northern New Hampshire Built by Baker & Forrest to Replace an Old Grade Crossing. **See Page 21.**

The Dredge Grand Lake

Hydraulic Dredges Build Without Dikes

"Grand Lake" with Power Barge Used by Sternberg Dredging Co. on Levees in Atchafalaya Floodway

✦ IN THE construction of the earliest hydraulic levees around 1930 at Rosedale, Miss., the contractors employed every artifice to so dike the levee section as to entrap every last particle of silt. Today, after a period during which all hydraulic levee construction was frowned upon, a new principle has been evolved. In the Atchafalaya Floodway neither materials nor foundations would be acceptable if anything better were available, but it is absolutely out of the question to import materials and still the area must be protected. Further, once the "coffee grounds and pea soup" material that emerges from the dredge discharge dries, it has proved, as in the 1937 flood, to be a worthy substitute for the older standard dry soils for levee construction.

Built from the Ground Up

Since there are no dikes built to hold back the flow of materials from the dredge pipes, the material flows out over the land until it comes to rest. It is necessary for the contractor to pump 3 or 4 cubic yards of material for one yard of "pay dirt" in the levee section. To stand and watch the flow from the dredge discharge is an education in materials, flow and delta formation. As one approaches the end of the pipe all the material may be seen flowing to the river side and no one is making any effort to direct it to the land side. Suddenly there is a choking of the pipe as a slug of clay comes through and as it breaks under the energetic application of a shovel after piling up at the end of the pipe, it runs to the place where the largest flow is going and plugs the flow. A second slug comes through and completely stops the flow toward the river side and all goes toward the land side for a time. Then comes a large bundle of cypress roots and chewed up stumps hungrily taken in by the cutter. They float on down the slope stopping here and there but eventually find their way to the toe of the slope on the rising tide of fluid mud and silt. Thus the levee is built up and does the job with the least apparent effort on the part of man, and clears away refuse that will not build good levee by washing away the finest material and the organic matter that may rot.

The levee sections were uniformly a 20-foot crown with a 1 on 20 slope to the land side and 1 on 5.5 grades for both land and river-side slopes. Various sections included 100-foot false berms with 1 on 20 slopes on both sides, starting at various distances below net grade where hydraulic placement of the material alone was used and where the allowance for shrinkage is 8 per cent. Other sections had false berms as long as 150 feet and as short as 50 feet, all with 1 on 20 slopes, and at the ends

(Continued on page 23)

New Rock-Fill Dam For Birmingham, Ala.

Walsh Construction Co. Builds Impounding Dam For Industrial Water Supply Project

(Photos on page 44)

✦ THE new rock-fill dam being built to impound a water supply for industrial purposes for the Birmingham, Ala., district is part of the sole project in the United States being financed jointly by PWA and WPA. This is such a remarkable occurrence that it has already appeared in Ripley's "Believe It or Not" feature. The story is this: Birmingham is located where there is no large source of water. The excellent domestic supply is not adequate for industrial purposes and the private utility owning the supply did not feel that it could finance the larger project. The City determined to undertake the project itself and sought a loan from the PWA to cover the impounding reservoir and its dam, a 39-mile pipe line to the city, a distribution reservoir and the necessary distribution lines within the city. Under PWA Project 6857R the City received a loan of $3,430,000 and a 45 per cent grant of $2,378,000. Instead of the City financing the work as it progressed, WPA came in and supplied the labor for the building of the distribution reservoir, clearing the impounding reservoir site and for the large dam, and the construction of the larger portion of the pipe line. If for no other reason, this project makes its bid for fame through the sole cooperative effort of the two great public-works financing agencies of the Federal government.

Outline of Project

Water will be impounded on the Blackburn Fork of the Little Black Warrior River by a rock-fill dam with a clay blanket upstream near Inland, Ala. This dam will be 195 feet in height and 1,100 feet along the crest, creating a reservoir of 22,000,000,000-gallon capacity covering approximately 1,600 acres. The work at the Inland site also includes the construction of a road to the dam. There will also be the 44 miles of steel pipe line, now complete, ranging in size from 16 to 60 inches, the distribution reservoir, a chemical treatment plant for the adjustment of the pH of the water to improve its character for industrial purposes and to provide for chlorination as a protection against its use for other than industrial purposes.

The contribution of the right-of-way for the greater part of the distance from the reservoir to the city by the Louisville-Nashville Railroad for the sum of one dollar was a great help in aiding the financing of the project and a true evidence of the interest of the railroad in the development of the industries of the City.

The steel pipe line was fabricated in lengths from 38 to 48 feet by the Chicago Bridge & Iron Co. and Ingalls Iron Works who received the contract for the production of the pipe in competition with high-tensile cast iron pipe. After fabrication, the steel pipe was lined with Bitumastic enamel and coated with the same material. The short section of line near Village Creek where it is exposed is painted with aluminum paint to improve its appearance.

The preliminary studies had contemplated the construction of a concrete dam of the gravity type. The foundations in sandstone and shale of the coal measures were considered suitable at rather shallow depths. More complete investigation, however, after money for the project was available, showed that a larger concrete dam would be required than at first contemplated. Therefore, complete designs for the concrete dam and an alternate rock-fill dam with compacted clay face were made and bids sought on both designs. According to A. Clinton Decker, one of the three members of the Engineering Commission responsible for the project, "The low bid for the rock-fill dam, $1,685,200, was more than $600,000 lower than the low bid on the concrete dam." The contract for the rock-fill dam was awarded to the Walsh Construction Co. of Davenport, Iowa. The completion date for the dam was March 19, 1938, with a penalty and bonus clause allowing a $400 a day penalty or bonus for later or earlier completion. The dam will be placed in service by March 1.

The distribution reservoir is located at Ketona, a short distance north of the city. This part of the project, an earth dam, will be described in an article in our March issue.

(Continued on page 18)

C. & E. M. Photo

Well Drills at Work in the Quarry for Birmingham's New Industrial Water Supply Dam

A Stabilized Base By Road-Mix Method

S. G. Hayes & Co. Build Series of F-A Projects for Missouri Highway Dept.

✦ AS PART of its 1936-37 program to determine the best method for stabilizing road bases for armor-coat surfaces, the Missouri State Highway Department awarded a contract to S. G. Hayes & Co. of Jefferson City, Mo., for the construction of 13 miles of bituminous stabilized base between Keytesville and Glasgow, Mo., using machine mix for the incorporation of the bituminous material in the aggregate. The work was divided into several sections for each of the projects so that different materials could be used for the stabilizing agent. A surface coat, or armor coat, of pea gravel was applied for the full length of the project and a portion of it was reinforced with cotton fabric as an additional experiment.

Preparing Base for Treatment

The contractor hauled in about 17 tons of gravel per station, the actual amounts varying from 14.7 to 22 tons, and dumped the material in a windrow near one side of the base. This material was bladed to a nearly uniform layer across the road and then scarified with the base to a depth sufficient to produce 40 to 42 cubic yards of loose material per station. The scarified material was then bladed to the middle of the road and the outside thickened section cut to be 7 inches deep at the edge, reducing to a uniform 4-inch thickness within 2 feet from the edge of the base. The method was to cut the 7-inch trench with the Austin-Western 12-foot motor patrol with hydraulic controls and windrow the material toward the center of the road. Then the material was bladed, using another Austin-Western 12-foot blade pulled by a Caterpillar Sixty and a Caterpillar 12-foot blade pulled by another Sixty. During this same operation three Caterpillar Thirties pulled three tandem discs and spring-tooth harrows through the material to break it up and speed the mixing of the new and old material. The blading ended by the material being carried beyond the center of the road. It was required that the material be broken down to a size of 2 inches or less.

Then when the right-hand thickened-edge trench and center section had been cut to full depth and the proper section, the material was bladed back to the right-hand side of the road again and the process repeated on the left-hand side and finally all the mixed material was moved to the right side of the road for mixing with the first material and the whole moved to a center windrow.

Mixing the Bituminous Material

The 13 miles of the contract was divided into several Federal-Aid Projects and these in turn were subdivided into test sections as follows:

FAP 288E—3.44 miles on which SC-3 asphalt was applied at approximately 2 gallons per square yard or close to 13 gallons per cubic yard.

FAP 288A—3.157 miles on which

(Continued on page 15)

C. & E. M. Photo

A Bucyrus-Erie Shovel Loading Athey Crawler Wagons with Rock for Hauling to the Crushing Plant at Inland Dam

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Another Factor in Good Roads

A Guest Editorial

By WILLIAM M. PARRISH,

President, Manufacturers' Division, American Road Builders' Association

Shortly before Christmas the thermometer hovered around the freezing point for several days in many of the northern states. Alternate snow and rain resulted in one of the most protracted periods of slippery driving conditions that have been experienced in the snow belt in a long time. It is a fact, however, that many roads on which snow plows were in regular use were comparatively free of ice throughout that terrific week or more of alternate freezing and thawing. Thus, once again, the value of good equipment, good management, and modern methods was demonstrated.

How many times have you driven from one county to another, or from one state to another, and wondered why the roads in one community are so much better than those in the other community—even though the two communities apparently are much alike as to population, prosperity and type of terrain? I often have wondered why one suburban community, for example, is able to do a good job of snow removal—not only on streets but also on sidewalks—while even the main streets of the suburb right next door to it are gutted with ruts most of the winter—ruts that make driving dangerous and also are mighty hard on the road surface. Frequently it costs more money in the spring to repair the damage to the road surface, caused by ruts in snow and ice during the winter, than an adequate job of snow removal throughout the winter would cost.

Conditions like this cause me to think that we in the highway equipment industry ought to do a better job of selling. If the equipment salesman were permitted to devote more study to the *needs* of the counties and states to whom he sells and less time to a comparison of his equipment with the products of competitors, road construction and maintenance in many sections of the country would be vastly improved and highway funds could be conserved and appropriated to the further expansion of the nation's highway system. I say this because we in the highway equipment industry, in our contacts with the varying problems of highway construction, maintenance and snow removal, are in a position to gather a vast amount of practical information about these matters which I feel is of greatest value only when it is passed on to those road contractors and officials who can use it.

For example, much progress has been made recently in the design of wheel scrapers and other dirt-moving equipment for road building. Many equipment salesmen have gathered considerable data regarding the amount of dirt these units have moved on various jobs, and the cost of doing the work. The savings being made in comparison with equipment previously used are, in many cases, very large. Likewise, there is a fund of information showing the cost of operation of various types of graders and the tractors and power plants used with them. These dollars-and-cents operation facts, however, are of little value unless contractors and road officials give equipment salesmen the opportunity to tell about them and compare them to the cost of operation of equipment now in use.

I feel that much is being accomplished along these lines by the equipment salesmen who are given an opportunity to make a real study of customers' needs. The buyer should make it possible for the salesman to do this. If a county, for example, instead of merely asking for bids on a road grader of a specified size and type, would present to the salesman facts about the amount and type of maintenance work to be done, and ask for his recommendations, the salesman, in innumerable cases, could save the buyer and the tax-payers large sums of money.

The equipment industry is ready this year with design, production facilities, and service backing that will keep pace with America's great road building and maintenance program. Anyone who attended the Road Show at Cleveland knows the extent of equipment progress for 1938. Getting job and equipment together is the big piece of work that is ahead of us now. It is my earnest hope that an increasing number of equipment buyers will help us by giving equipment salesmen more of the facts they need to do a good job of fitting equipment to the work to be done.

India Builds Roads To Compete with Rails

About 25 per cent of the money which has been set aside by the Punjab Government in India for road development is to be spent on competitive roads in order to reduce railroad competition and not less than 25 per cent will be spent on feeder roads to railways. This 8-year plan calls for the expenditure of $4,678,000.

Provisions for the improvement of village roads, provincialization of 800 miles of District Board metalled roads, and for the construction of 500 miles of new metalled roads are included.

At the end of this period, the Government will have tarred and metalled about 4,000 miles and will have about 10,000 miles of unmetalled roads in condition for motor vehicles. Due to extensive tarring, it is hoped that after the completion of the plan the maintenance will not exceed the present cost, which is about $17,962.

Gas Tax Diversion Fallacious Economy

Speaking before the Massachusetts Federation of Taxpayers' Associations, Governor Hurley defended the practice of diverting gasoline tax revenues as "entirely consistent with the principles of economy in Government." He asserted that it was designed for the purpose of reducing the heavy tax burden on real estate and home owners.

Commenting on this subject editorially, *The Nerba* rather aptly points out the fallacy in that line of reasoning, as follows:

"We have before pointed out that diverting gasoline tax revenues for the purpose of reducing the real estate tax burden on home owners is a deceptive practice because a simple study shows that under that practice more is taken from them in diverted gasoline taxes than they get back in reduced real estate taxes. For instance, the $6,600,000 diverted last year from the highway fund to the general fund, in pursuance of Governor Hurley's policy, is something over the total receipts from 1 cent of the gas tax. That diversion reduced the amount of the state tax upon Boston and made the Boston tax rate about $1 less than it otherwise would have been.

"This is the effect that 1937 diversion has upon small home owners in Boston who also own motor vehicles. Such a small home owner, living in Dorchester, with an annual income of $3,000 and a home assessed at $5,000 valuation, using the average annual consumption of 800 gallons of gas in his car, paid in 1937 as his portion of the diverted gasoline tax money the sum of $8. His real estate taxes will be $5 less than they would have been if the gasoline tax money had not been diverted. It will cost him in diverted gas tax $3 more than his saving in real estate tax. A motor vehicle owner living in Charlestown, with an annual income of $1,500, owning a home assessed at $3,500, using 600 gallons of gas in his car, paid $6 in diverted gas tax to save $3.50 in his real estate tax.

"So it is clearly apparent that the diversion practice places an additional burden upon the small home owners who also own motor vehicles, instead of being a measure of relief for them. But a big Boston hotel saved $8,000 in its real estate taxes and a big Boston bank saved over $11,500 in its taxes on properties owned in one Boston ward alone, forgetting its large real estate holdings outside of that one ward. The 1937 diversion took $3 from the pockets of 2,667 Dorchester motorists, like the one described above, to save $8,000 in real estate taxes for the big Boston hotel and $2.50 from the pockets of 4,600 Charlestown motorists, situated like the one described, to save $11,500 in real estate taxes on properties owned by the big Boston bank in one city ward alone. That is why we say that the practice of diverting gasoline tax revenues to reduce the real estate taxes of small home owners is a deceptive device."

While the situation described above applies to Boston and nearby communities, the reasoning is sound and it is logical to assume that a careful study of the effects of gas tax diversion in other communities would show the same uneconomic results.

In addressing the Canadian Good Roads Association at its recent annual meeting, Hon. A. A. Dysart, Prime Minister of New Brunswick, said "The problem of road construction is one that calls forth the best brain power this land may boast of, the problem affecting as it does safety-control on the road. The tragedies that carry streamer headlines in every paper in this country almost daily are a challenge to those assembled here, as well as those in the background who are not here but support those who are here, to find some satisfactory solution."

Cartoon by George Clark

"I Been Workin' with This Shovel Ten Years, Lady, and You're Tellin' Me It's Noisy!"

Attractive Roadsides As Lure for Tourists

One of the economic phases of roadside development which must not be overlooked is the fact that tourists may be attracted to a state by its roadside development. Because tourists annually bring $80,000,000 to $90,000,000 into Minnesota and believing that inviting highways with accommodations for enjoyment of the natural beauty of the state will aid in bringing more tourists, the Minnesota Highway Department's Roadside Development Division is conducting a long-time beautification program with the cooperation of the National Youth Administration. At the same time, Harold Olson, Director of the Roadside Development Division, points out that the cost of the program is largely offset by prevention of erosion and grade disintegration generally, which is an aid in reducing the cost of maintenance of the right-of-way of state highways. He also points out that beautification has an additional value in that it provides safer highways through rolled shoulders and better vision.

The National Youth Administration in Minnesota has 1,500 young men doing part time work. In cooperation with the State Highway Department these employees furnish labor and material in the form of shop-made equipment for roadside development, while the Highway Department supplies plans, supervision, landscape architects, trucks and material in advancing the program.

In 1937, the first full year of cooperation between the two agencies, twelve projects were developed along the highways and include more than 300 picnic tables, 100 fireplaces, 15 council rings, six springs and the perpetuation of a number of historical markers. Landscape development and ground improvements have resulted in the planting of 1,400 trees and shrubs and the removal of 5,665 cubic yards of earth. Stone masonry totalling 240 cubic yards was also laid.

Design of Concrete Bridges

Hardly anywhere are bridges designed without giving consideration to appearance, beauty and architectural design, and a new booklet dealing with the timely subject of architectural principles that apply to the design of bridges has just been issued by the Portland Cement Association.

The booklet "Architectural Design of Concrete Bridges" presents the fundamental principles of architectural design, including unity, definition and inflection, and their application to a number of practical cases of bridge construction is illustrated.

Copies of this booklet may be secured free by interested state, county and other engineers direct from the Portland Cement Assn., 33 West Grand Ave., Chicago, Ill.

Sealing Concrete Against Weathering

Since concrete is an artificial rock and, like natural rock, is subject in various degrees to disintegration from weathering, including changes in temperature and alternate freezing and thawing, and since concrete itself contains certain solubles which in themselves may cause disintegration, certain methods of treating concrete have been devised for sealing the surface to prevent weathering. One of the latest is V-9, a treatment placed on the market by the Marvik Corp., Grant Building, Pittsburgh, Pa.

The V-9 treatment consists first of filling the interstices of exposed concrete with a penetrating material composed of solvents and a synthetic resin, and secondly sealing it with a coat of the same type of material which has in addition a pigment which gives a waterproof surface approximating a finely rubbed sand finish in texture. This material is reported to be alkali and acid-resistant, non-oxidizing and non-saponifying and also able to retain its elasticity through wide ranges of climatic temperatures.

The Marvik Corp. states that the V-9 products have been applied on concrete structures throughout the country and under varying weather conditions, and reports no failures.

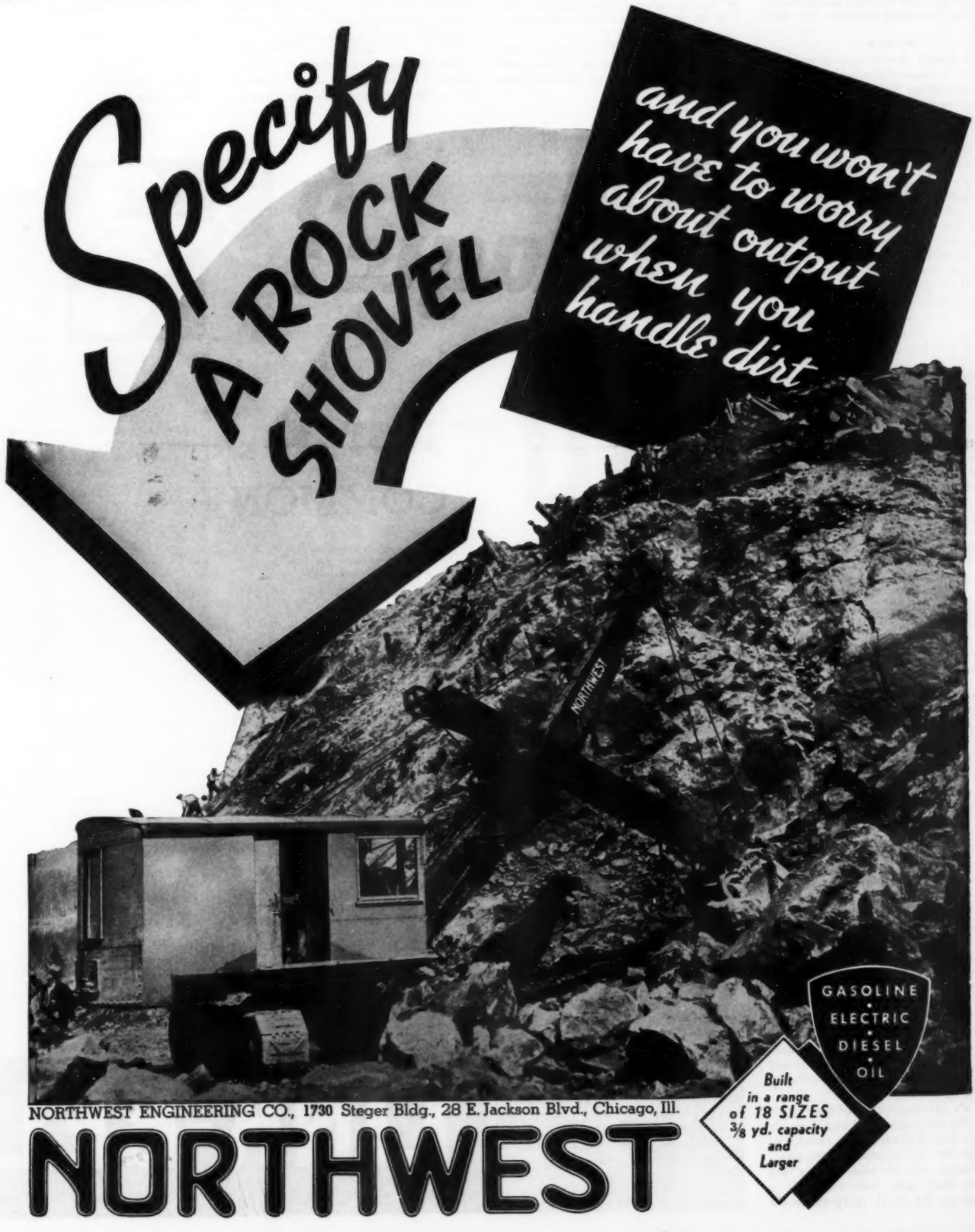
Copies of V-9 literature as well as copies of a reprint, "How Permanent Is Concrete" by Prof. David L. Snader, Stevens Institute of Technology, may be secured by engineers and contractors interested in this type of waterproofing and weatherproofing concrete direct from Marvik Corp. by mentioning this magazine.

N. Y. Dealer Opens Branch

The J. Shuman Hower Co., distributor of material handling equipment with headquarters at 85 North Genesee St., Utica, N. Y., has announced the establishment of a branch at 721 City Bank Bldg., Syracuse, N. Y., under the management of Hunter L. Betts.

This new branch will handle the same line of equipment as is handled in Utica, including Link-Belt 1 to 3-yard shovels and cranes, Buckeye ⅜ to ¾-yard shovels, cranes, trenchers and spreaders, Williams buckets and trailers, Ransome pavers and concrete equipment, Tru-Lay preformed wire rope, Page highway guard and traffic tape, Signal Service traffic signs, Dual automatic parking meters, Johnson bins and batchers, Howe motor truck scales, Huber graders and rollers, Schramm compressors, Cleveland air tools, Timken detachable bits, Meyer and Johnson snow plows, Lincoln motors and welders, Goulds pumps and Irving grating, armouring and bridge decking.

This company has also announced that it has recently been appointed distributor for Barber Greene loaders and conveyors and C. H. & E. pumps, hoists and rollers.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Road Show Paragraphs

✦ THE 1938 A.R.B.A. Road Show was one of superlatives. It was the biggest in point of space required, the largest amount of equipment was displayed, and if everybody got as tired as we did they thoroughly enjoyed themselves. Among the "biggest" at the show was Cliff Thompson, 8 feet 7 inches tall and weighing 460 pounds and, except for molecules, atoms, and colloids that might have been discussed at some of the exhibits, the "smallest" we saw was the bounding ball bearing, bumptiously beating a burnished bowl in the SKF exhibit.

✦ ✦ ✦

U. S. Steel's robot must have been feminine because its steel jaw never tired from morn till night as it waggled in perfect synchronization with the spoken word.

✦ ✦ ✦

Whether you looked at them as toys or a scientific demonstration, Austin-Western's pair of 99's furnished food for thought. The dummy driver on the unit which steers on all four wheels stopped his machine right on the dotted line while "The Voice" told the sales story, and then he backed, went forward, and even shifted the tiny blade at just the right moment. It was fascinating, interesting and instructive.

✦ ✦ ✦

Barrett Co. returned again to its position of host and its treat of cold cider. This was welcomed by all, even those who remembered last year's successful performance of "Rain."

✦ ✦ ✦

Armco showed a model hillside with a reservoir at the top, then a flume, powerhouse, draft tubes, culverts, sluice and floodgates, with a miniature railroad running into the hillside. Many spectators suspected a complicated turntable or switch yard beneath that mountain lake, but Spindler informed us authoritatively that the miniature train was reversed by one or more pairs of human hands.

✦ ✦ ✦

Seeing was believing at the Hercules road roller exhibit, with Loadometers telling the true story of just how much pressure that Ironeroll can put on the high spots.

✦ ✦ ✦

International Harvester struck a new note of exhibition prowess by featuring the "International Highway," in addition to its own showing of power units, generating sets and tractors. The highway showed International tractors with V-type plows pushing truly realistic but non-melting snow, and graders, scrapers and other road equipment pulled or powered by International tractors. They were right out on the grade up there on the ramp and the good earth was real and dusty.

✦ ✦ ✦

Did you quench your thirst at the drinking fountain at Byers' exhibit? My drink brought me the greeting, "This drink is on Byers, Fella! The outstanding buy of 1938 is Byers 82! Have you seen it?" These electric eyes have it!

✦ ✦ ✦

Chain Belt did a neat job with Pumpcrete pipe and several cans of Chinese red paint in making an effective and readily visible fence about its exhibit.

✦ ✦ ✦

Jeffrey's gyrating panel of nine gears and two chains was almost unbelievable until one stayed around long enough to note that the background of the panel was turning around also. Then did you note that those four vibrators at the front of the booth truly made the aggregate run up hill? That aggregate was crushed rock, rice and silica sand, but it did its stuff every time the juice was turned on.

A Cleveland Model, Miss Grace Roth, Inspects the Working Model of the New 99 Grader at the A-W Exhibit with H. P. Barrows of Austin-Western

Waukesha had one of those "seeing is believing" exhibits with huge cardboard models of Waukesha-Hesselman engines in which the burning of the oil upon ignition was displayed in true colors. P. C. Ritchie, Advertising Manager, told us that an artist watched for hours before a prepared model studying the actual burning of oil in the cylinders and making numerous water color sketches.

✦ ✦ ✦

"Come on! Come on! Come for a sky ride with all the thrills and none of the danger!" is what a barker might have said in front of the excellent model of Cleveland as seen from the sky, and that brings us to the most fascinating and tormenting stunt of the show—Caterpillar's pencils on a loop, tucked into your buttonholes so neatly by those smiling damsels. Did you get yours off without breaking anything?

✦ ✦ ✦

The practically continuous "talkies" shown by Caterpillar in the balcony above the Arena were doubly popular,

The Biggest Human at the Biggest Road Show—Cliff Thompson, the Tallest Man in the World

for their own interest and as a very welcome opportunity to rest those thousands of pairs of tired "dogs" which paraded through this greatest of all Road Shows.

Magic?

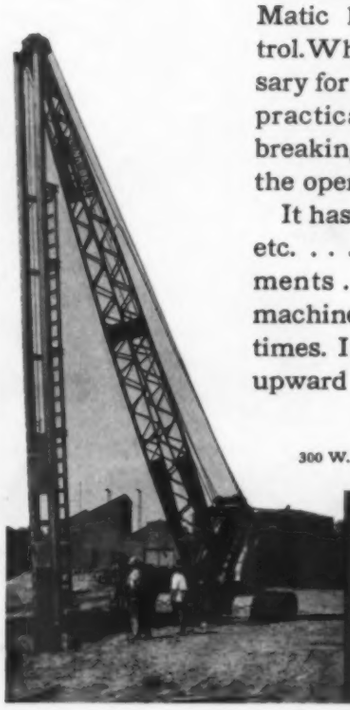
NO — JUST COMMON SENSE

● Users stress the simplicity and reliability of Speed-o-Matic hydraulic-pressure control. Where they had thought a complicated set-up necessary for its amazing results, they found merely a simple, practical, natural method of transferring the back-breaking effort of manipulating mechanical levers from the operator to the power of the machine itself.

It has fewer parts... reduces wear on clutches, brakes, etc. . . . requires no complicated or sensitive adjustments . . . gives the operator perfect control of the machine—the feel of the clutches and brakes at all times. It has increased digging speeds from 25% and upward with corresponding yardage increases.

LINK-BELT COMPANY

300 W. Pershing Road, Chicago Distributors and Offices in Principal Cities



LINK-BELT

Indicator on Scraper Aids Operation of Unit

The new line of hydraulic scrapers, featured by the Heil Co., Milwaukee, Wis., at the Cleveland Road Show, incorporates a number of new features of design. These Model RS scrapers have been put through exhaustive tests to show their ability to pick up a full load in quick time, and to unload while the tractor is traveling at top speed. Only three hydraulic cylinders, which are exactly alike with all component parts interchangeable, are required to operate the Heil scraper. A specially-designed rotary gear pump provides the necessary hydraulic power.

One outstanding feature is the indicator gage mounted on top of the control valve at the front of the scraper. By watching the dial on this gage, the operator has positive control of the depth of the cut and, when spreading, the same dial indicates the height of the bowl above the ground. This indicator gage thus takes the guess-work out of scraper operation in cutting and spreading.

The New Heil Model RS Scraper

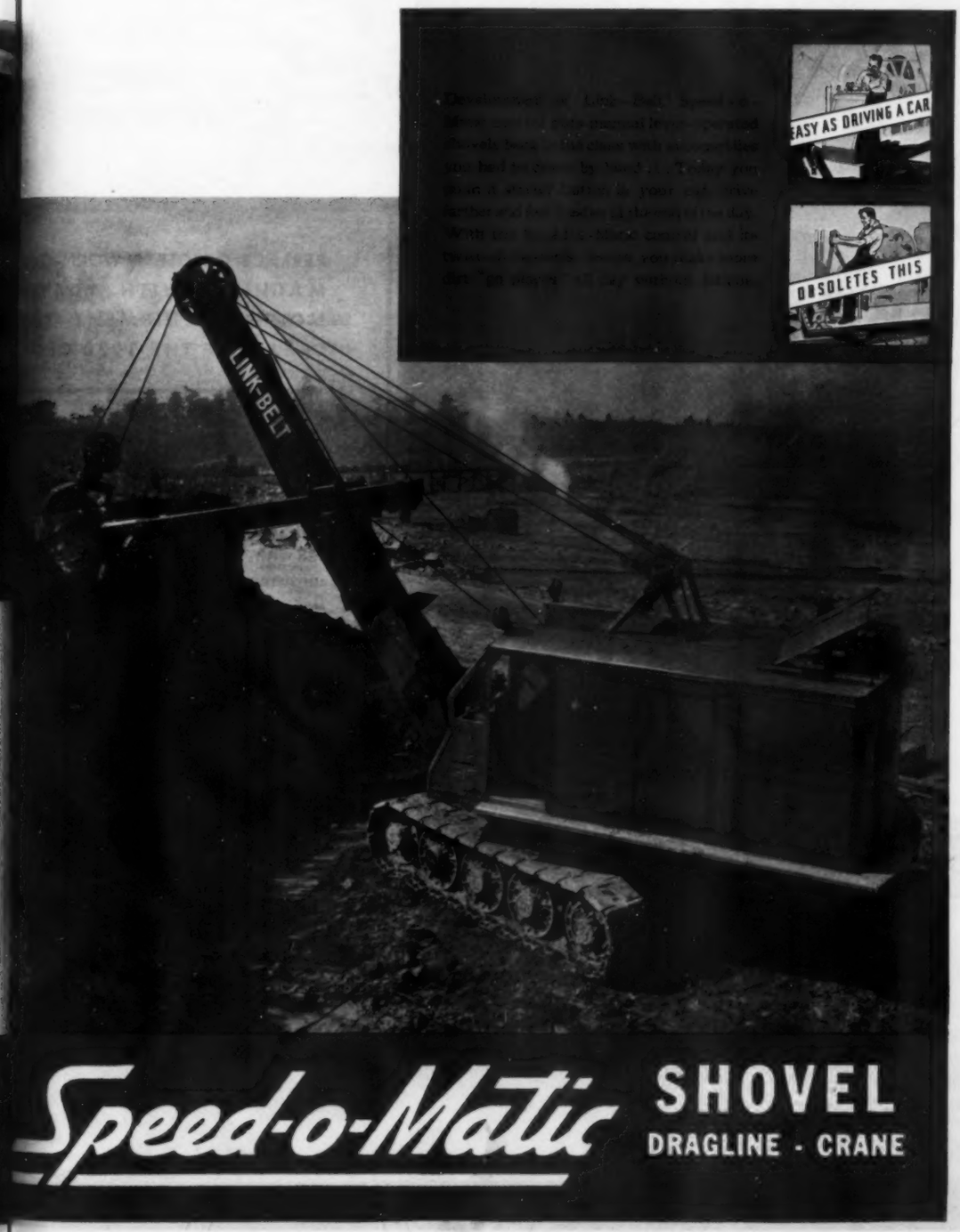
Anticipating the demand for its equipment in 1938, the Heil Co. recently completed a large plant expansion program, including additions to both the Milwaukee, Wis., and Hillside, N. J., plants.

New Excavator Tire Resists Cuts and Wear

A tire especially built for the most destructive type of tire operations, such as on trucks and trailers used in rock quarrying, excavations in rocky soils, and similar heavy-duty service resulting in rapid tire-tread wear and tread and side-wall cuts and snags, has just been announced by the Firestone Tire & Rubber Co., Akron, Ohio.

The tread and side walls of the new Firestone excavator tire are so compounded as to be much tougher. Specially tough cut-resisting rubber plus greater thickness of the tread and side walls give the added protection necessary to keep most cuts and snags from extending to and injuring the cord body. The shoulders have been made higher to distribute the load better and are wider to protect the side walls. It also has construction features which absorb impact shocks without injury to the cord body.

This new type of tire for construction service is available in a range of sizes popular with vehicles in the types of service for which it is built. Further information may be secured direct from the manufacturer by mentioning this magazine.



The New LB Surfacing Drag

A New Floating Drag For Road-Mix Surfacing

A working model of the new Littleford surfacing drag built to scale was a feature of the exhibit of Littleford Bros. at the Cleveland Road Show. The full-sized drag, 24 feet long, was a bit too large to include in the exhibit space available.

The new unit consists of a 24-foot framework with several staggered rows of free-floating plows with a strike-off blade in the center of the length. This drag is built especially for road-mix bituminous work, and is used for leveling, resurfacing and wedge courses. It will handle up to 120 pounds of stone or an average compacted surface coat of 1¼ inches.

Elimination of segregation in the mixing process, a complete mixing in one pass and the ability to iron out existent irregularities in the old road surface are claimed for this drag as its principal features. It has no motive power, requiring a 40 to 60-hp tractor or equivalent to pull it under full load. There are no pugmills or full-width diagonal blades used for mixing.

Complete information regarding the Littleford surfacing drag may be secured from Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio.

Diesels for Equipment Conservatively Rated

With a background of 3,000,000 hp of diesels in service throughout the world, Fairbanks, Morse & Co., 900 So. Wabash Ave., Chicago, Ill., offers the construction industry its Model 36-A diesel power unit of the 4-stroke medium-high-speed type. Conservatively rated as to horsepower capacity, mean effective pressure, piston speed, bearing pressures, etc., these engines are particularly adapted for long continuous service under heavy loads.

The large main crankshaft bearings are firmly supported by the lower base, insuring extreme rigidity and freedom from vibration. All working parts are completely enclosed, yet readily accessible for inspection. All bearing surfaces are well-supplied with a continuous flow of filtered lubricating oil under pressure. The number of moving parts has been reduced to a minimum further to increase the factor of reliability so essential in construction service.

These engines are available for a wide variety of service requirements, either as self-contained units complete with radiator, hood and skids, or the engine alone, both with or without clutch. The line is made in two cylinder sizes 4¼ inches by 6 inches for 1,200 rpm and 5½ inches by 7½ inches for 900 to 1,200 rpm, depending on the service. The smaller cylinder size is available in 1, 2, 3, 4 and 6-cylinder units and the larger in 4, 6 and 8-cylinder units.

Operating on low-priced fuels with an efficiency said to be twice that of a gasoline for similar service, the engine has remarkable economy. Power is reported to be generated at less than $0.0075 per hp-hour.

Construction details and other particulars of the Model 36-A F-M diesel power units will be found in Bulletin 3600-A1 which may be secured from the manufacturer by mentioning this magazine.

Snow and Ice Priority Map Simplifies Winter Problems

A map of the State of Ohio, known as the Snow and Ice Priority Map, has been prepared by John Jaster, Jr., Director of Highways, to simplify the work of snow removal and sanding on the state highway system. First prepared two years ago, it has now been perfected to the point that any route will be cleared and sanded over its entire length simultaneously, although it may extend over several counties or from one division of the state into another.

Numbers shown in circles, corresponding to the priority schedule in the lower left-hand corner of the map, give the relative order in which roads are to be cleared and sanded in any county. The more important highways in the state system are shown in heavy black lines and these are the ones which are naturally given first attention, but all state roads are cleared as promptly as possible.

For this purpose all snow removal and sanding equipment of the state highway department has been carefully located at strategic points distributed over the various counties of the state, and is ready for instant action, day or night. Each crew is responsible for a very definite mileage of highways, with positive instructions to proceed beyond its territory, if necessary, until it meets the equipment advancing toward it from the adjacent territory. Hourly progress is reported by each crew to local headquarters, and these reports are immediately consolidated and passed on to Columbus and to newspapers.

Copies of this Snow and Ice Priority Map are available to interested state and county highway engineers from the Bureau of Maintenance, State Highway Department, Columbus, Ohio.

New Byers Dealer in Ore.

The Andrews Equipment Service, N. W. Broadway & Flanders St., Portland, Ore., is now representing the Byers Machine Co. for its complete line of power shovels and cranes from 3/8 to 1¼-yard sizes. W. D. Andrews is Manager of this distributor firm and J. M. Robinson is Sales Manager.

REPLACE OBSOLETE, WORN-OUT MACHINES WITH ADAMS MODERN EQUIPMENT—THE CREAM OF THE 1938 CROP

● Time marches on, leaving in its wake antiquated machines and methods which carry to the discard all who cling to them. Keep step with progress—it pays. Be up to date in '38 with Adams—the most complete, most modern, and most progressive line of machinery of its kind in the world—a leader for fifty years.

J. D. ADAMS COMPANY

Dickey County, N. D. Reports

The most important road job of 1938 in Dickey County, North Dakota, will be the oil surfacing of Route No. 281 from one mile north of Ellendale for a little more than 18 miles north to the LaMoure County Line. The preliminary grading, the plans for which are not yet completed, will be done by the county, according to E. W. Ackert, County Surveyor, but the contract for the surfacing will be let by the State Highway Department.

Other road work to be done will be of a WPA nature, for which the county authorities are only partially responsible.

Sheet Piling Book and Cofferdam Calculator

Technical information contained in a new illustrated booklet on steel sheet piling installation includes chemical analysis of the special steel used by the Inland Steel Co., First National Bank Bldg., Chicago, Ill., for piling sections and brief reports of the installation method followed in the projects which are illustrated.

Contractors, construction superintendents and designing engineers will be interested in the Cofferdam Calculator developed by the Engineering Department of Inland Steel Co., which may be secured free by those writing direct to Inland and mentioning CONTRACTORS AND ENGINEERS MONTHLY. By means of several sliding scales, this calculator cuts short the time necessary to estimate a piling job. The handy arrangement of the scales and data was developed and has been copyrighted by Inland.

White Concrete Traffic Lines

In a booklet, "Permanent Safety with Medusa White Portland Cement," the Medusa Portland Cement Co., 1040 Midland Bldg., Cleveland, Ohio, describes and illustrates permanent white traffic markers built with Medusa white portland cement and illustrates many installations, some as old as 14 years. Methods of installing are also described and specifications included.

Copies of this 25-page booklet may be secured without cost by interested readers mentioning this magazine.

There are Adams Leaning Wheel Graders in 6½-ft. to 12-ft. sizes. Nothing quite equals their efficiency and all 'round adaptability . . . Then there are Adams Motor Graders in five models ranging from 22½ h.p. to 62 h.p. (gas and Diesel) with many valuable and exclusive features . . . Adams Elevating Graders, Hauling Scrapers and Retread Pavers are outstanding favorites.

Before you buy any equipment, let your local Adams representative give you full particulars on any or all of these machines. If he is not in touch with you, please write.

INDIANAPOLIS, INDIANA

Branches and Representatives throughout the United States

New Highway Widening Machine

Machine Cuts Trenches For Pavement Widening

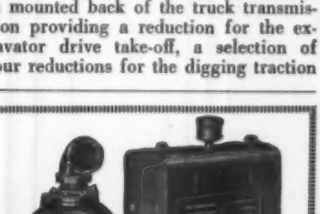
A new machine has been developed for excavating clean trenches along the sides of existing pavements where roads are to be widened. The new Buckeye Model 16-R highway-widening machine of the Buckeye Traction Ditcher Co., Findlay, Ohio, will dig a trench from 12 to 48 inches wide and 12 inches deep in one cut, working right up to the curb or to the edge of the existing pavement, leaving a clean, smooth subgrade ready for the foundation for the new pavement. By the use of a large digging wheel and suitable bucket equipment, this machine may also be used to cut curb trenches, clean small roadside drainage ditches, and similar work. For certain classes of work, a conveyor is available for loading the spoil into trucks if needed.

The complete machine is mounted on a heavy-duty truck and the digging-wheel assembly is so mounted that it may be swung around to a position in back of the machine, thus bringing the overall width of the machine within the maximum width allowable for transportation on state highways. The machine moves from one job to the next at regular truck speed. Arriving on the job, the digging wheel assembly is swung back into digging position by rotating about the rear uprights. The entire ditching attachment is removable, permitting the truck to be used for other purposes.

For digging, the truck operator's seat swings around so that the operator has an unobstructed view of the excavating mechanism as well as of the roadside ahead. Controls are banked within easy reach. A special midship transmission is mounted back of the truck transmission providing a reduction for the excavator drive take-off, a selection of four reductions for the digging traction drive and a direct drive for road speed. This midship transmission, which powers the ditching apparatus, is a permanent attachment to the truck, ready to connect with the ditching attachment as needed. The excavator-wheel drive is taken from the midship transmission through a double universal joint with a Twin Disc friction safety clutch to guard against overloads resulting from unseen obstructions.

The digging-wheel assembly rides on sliding guide shoes, supported by heavy tubular uprights, and is raised and lowered by means of steel wire cables operating through a worm and gear unit in an oil-tight case. When the machine is digging, the supporting cables are adjusted so that the rear end of the excavating mechanism rides on a shoe or leveler securely bolted to the excavator frame and provided with a runner which rides the bottom of the excavation.

The buckets for the digging wheel are available in sizes to give trench widths of 12, 18, 24 or 27 inches for the lighter Model 16-R, and 12, 18, 24, 30, 36, 42 and 48 inches for the heavy-duty Model 16-R-4. The lighter weight model is mounted on a new 1½-ton Ford or Chevrolet chassis, while the heavy-duty model may be mounted on any new or used truck in good mechanical condition, having a rated capacity of 3 tons or more, and a wheelbase of 168 inches or more.



Dependable pumps for every purpose, ranging in size from 1¼" to 10"
Write today for new catalog describing the complete line.

Sterling
MACHINERY CORPORATION
[illegible] Southwest Blvd Kansas City, Mo.

SAND'S-STEVENS
Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8531 Gratiot Ave. Detroit, Mich.

See the Rex Mixers for '38!

See the new Rex Modern Drum mixers—the mixers that are designed and built for greater speeds and more dependability. They're lighter, stronger, easier to handle than ever before. See the Rex 3½-S—the ideal "odd jobber" around large construction projects. See the Rex 5, 7 and 10-S, two- or four-wheel trailer models, with Pressed Steel Drum Heads, Pressed Steel Timken Drum Rollers, Rex Non-By-Pass Water Valve, and engines mounted "above the dirt line." You'll see why it pays to *Buy a New Rex!*

Send for bulletins today!

Chain Belt Company
1666 West Bruce Street
Milwaukee, Wisconsin

REX CHAIN BELT COMPANY of Milwaukee MIXERS

The Most-Copied
3/4 YD. SHOVEL IN AMERICA
LORAIN-40
THEW CENTER DRIVE
• Like all products which successfully pioneer new fields, the ¾-yd. Lorain-40 shovel is not without its imitators. But the contractor who has an eye for real values will have no difficulty in spotting the "original" because—
1. No other machine on the market has the patented sloping machinery frame—the greatest single factor in obtaining maximum capacities at minimum weight.
2. None of the machines following in the footsteps of the Lorain-40 have been as thoroughly proved and tested by 5 years of contractor service and millions of yards of excavation.
3. No other machines have demonstrated their ability to match the performance record of this unit. A survey of 38 jobs shows the ¾-yd. Lorain-40 has maintained an average of 89 yds. per hour.
Catalogs and data on Lorain-40 construction and performance can be obtained by writing
UNIVERSAL CRANE DIVISION • THE THEW SHOVEL CO.
LORAIN, OHIO

The New Kinney 1,000-Gallon Bituminous Distributor

Half-Dozen New Features Of Kinney Distributor

The 1,000-gallon distributor exhibited by Kinney Mfg. Co., 3529 Washington St., Boston, Mass., at the Cleveland Road Show has at least a half-dozen new features of interest to users of bituminous distributors. The tank on the new Kinney distributor is of alloy steel instead of ordinary tank steel, permitting a saving of approximately 1,000 pounds on a 1,000-gallon unit with greater strength. The unit exhibited at Cleveland had an entirely new piping and control system with Westinghouse air-brake diaphragm controls, similar to those familiar for truck use, used to actuate the spray valves. The air valve is mounted in the truck cab, placing the entire truck and distributor within the easy control of one operator. Duplicate control at the rear end is furnished at slight additional cost. The machine can be converted to manual control in two minutes.

The spray bars on the Kinney distributor are cleaned by the use of high-pressure air automatically admitted as the spray line is closed. The engine to drive the pump is a Ford V-3 60-hp unit with Ford transmission, giving two forward pump speeds and also a reverse for pumping back to tank cars. This model of the Kinney distributor also features the large-capacity jacketed Kinney pump, inside closing valve, improved nozzles and spray bars, air-cleaned patching hose and stresses the safety features. The auxiliary gasoline tank is located well away from the burners; relief valves are furnished for air, fuel and bitumen lines; heat flues are located low in the tank; and ladder and hand rails are supplied for the operator's safety and convenience, resulting in a trim unit operating economically without sacrificing accuracy. The distributor is mounted on a Model 718 White truck equipped with air brakes, auxiliary transmission and an extra gas tank.

Complete information on this new model will be found in a Kinney Bulletin which will be sent to readers of CONTRACTORS AND ENGINEERS MONTHLY free on request.

Six-Cylinder Engines With Overhead Valves

Two new models of gasoline engines have been announced by the Buda Co., Harvey, Ill. These models, M-707 and M-766, have 6-cylinder engines with overhead valves, and 707 cubic inches displacement with a 5-inch bore and 6-inch stroke and 766 cubic inches displacement with 5½-inch bore and 6-inch stroke, respectively.

The crankshafts are 3½ inches in diameter with seven main bearings and the connecting rods are 12½ inches center to center. All crankshafts and connecting rod bearings are of the replacable "precision" type. Lubrication is by positive force-feed pressure to all crankshaft, camshaft, connecting rod and piston pin bearings and to rocker arm shafts and timing gears.

These two models are built for various types of installations, including shovels, cranes, draglines, hoists, heavy-duty trucks, stationary and portable compressors, pavers, crushers, locomotives and rail cars.

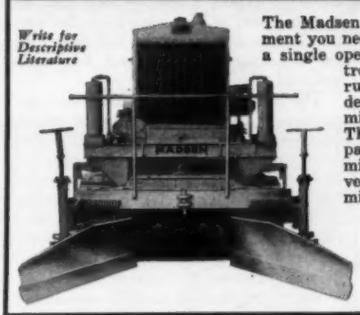
Track-Laying Equipment Exhibited by Athey

The latest developments in the Athey line of track-laying hauling units were exhibited by the Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Ill., in conjunction with the Caterpillar exhibit at the Cleveland Road Show last month. The new pieces of Athey Forged-Trak equipment were the 18-yard Forged-Trak bottom-dump trailer and the 16-yard two-way dump trailer.

Recent additions to the Athey line, these two dump trailers embody the Athey Forged-Trak principle of gaining lower yardage costs by overcoming hauling hazards, the manufacturer claims. Both units are mounted on Forged-Trak wheels.

The 18-yard unit has a fully automatic mechanical wind-up, mounted in the front of the frame and the trailer is spring mounted on the axle. The 16-yard two-way dump trailer is a general utility unit for handling dirt, rock, sand or mixed materials. This unit dumps right or left and has down-folding side gates that are fully open when the body is raised 18 degrees from the horizontal. The dumping angle is 55 degrees. Both units have easy maneuverability, allowing them to get close to the dipper, assuring a shorter dipper swing with consequent saving in loading time.

MADSEN ROAD PUG

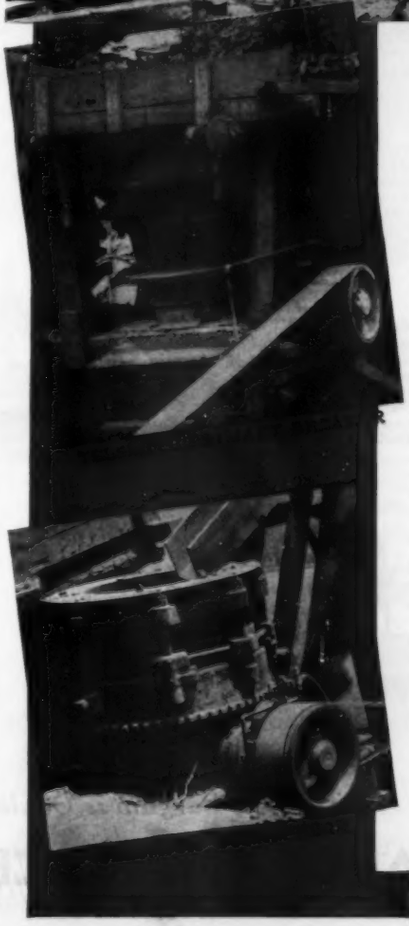


Write for Descriptive Literature

The Madsen Road Pug is the one piece of equipment you need to accomplish your road mixing in a single operation without sacrificing batch control. Operated easily by two men and running on economical diesel power, it delivers a product as consistent as plant mix using the same aggregates.

The Madsen Road Pug exceeds in capacity. If you are contemplating road mix work, you owe it to yourself to investigate the Madsen process of road mix.

MADSEN IRON WORKS
Manufacturers
Huntington Park, California



CRUSHED STONE
for Roads
AT THE LOWEST COST PER TON

A well-known Southeastern contractor, E. W. Grannis of Fayetteville, N. C., had his troubles in crushing hard abrasive rock for road grading and surfacing jobs. Jaw crushers proved unsatisfactory for both coarse and secondary crushing—also very expensive to maintain. Rolls also proved inadequate. Along with other big operators, Grannis has solved his crushing problems by discarding jaw crushers for Telsmith gyratory breakers. For secondary crushing, roll crushers were replaced by Telsmith Gyraspheres — with distinctly better results.

Mr. Grannis had a 6½ mile road job at Mocksville, near Statesville, N. C. And it meant 50,000 tons of minus 1½ in.—crushing granite boulders and field stone. So he bought this complete Telsmith rock crushing plant—(A) No. 13B Telsmith Gyratory Crusher; (B) 32 ft. No. 6 Telsmith Belt Elevator; (C) 4 ft. x 10 ft. Telsmith double deck Pulsator Screen; (D) 16 in. x 22 ft. Telsmith Reject Conveyor; (E) No. 36 Telsmith Gyrasphere Crusher. The screen is mounted over a 25 cu. yd. bin. A 100 hp. Diesel powers the equipment.

This Telsmith plant has convincingly demonstrated its ability to produce stone for road grading and surfacing at the lowest possible cost per ton. And it has set a remarkable record for low maintenance. Whether you are planning a new plant or modernizing, *write for Bulletin E-34* describing Telsmith quarry and gravel pit equipment. GC-3-38

SMITH ENGINEERING WORKS
4014 N. HOLTON STREET MILWAUKEE, WIS.
Associates in Canada: Canadian Vickers, Limited
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50 Church Street, New York City
211 W. Wacker Drive, Chicago, Ill.
713 Commercial Trust Bldg., Philadelphia, Pa.
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412 Westinghouse Bldg., Pittsburgh, Pa.
Brandeis M. & S. Co., Louisville, Ky.

TELSMITH

Aiding Winter Travel On Idaho's Highways

Heavy Drifts at High Elevations Complicate Problem of Snow Removal And Tax Personnel

By J. H. CLABBY, Statistical Engineer, Idaho Department of Public Works

(*Photos on page 44*)

✦ Modern methods of travel and transportation have added much to man's happiness but they have also added a new type of contest where man finds himself in direct combat with the weather elements in their most belligerent form.

Accustomed to modern conveniences and luxuries in transportation, man insists on traveling the highways twelve months of the year with little thought to the public servants and their snow-fighting equipment until he finds that his progress has been retarded by roads made impassable by snow-banks.

Idaho's Problems

The State of Idaho includes arid deserts, valleys, tablelands, snow-capped and forest-clad mountains. Elevations range from 700 to 13,000 feet above sea level, with a corresponding variety of climate and rainfall. Highway elevations range from 750 to 8,700 feet; but snow removal operations are confined mainly to elevations of from 2,000 to 5,000 feet. In many sections, the main highways traverse great distances of sparsely settled or uninhabited areas. These variations offer many problems to the service of continuously open roads and other features incidental to highway maintenance. During the months of January, February, and March, there is seldom any certainty as to the condition of the highways. The snow becomes deep, snow fences become filled-up, and the high snow-banks, pushed to the road shoulders by plows clearing the deposits of earlier storms, present miles of hazardous conditions. The drifting snow, swept by strong winds, soon renders some of the highways impassable. Anxious travelers find themselves halted in their journeys. Large trucks and plows advance to the scene of trouble releasing snow-bound cars, and doing their utmost to hold an opening through the drifts. Day after day and night after night, the battle with the weather elements is waged. At times, the elements gain ground until the weary drivers of equipment are forced to retreat to other sections which can be held until the storm has abated.

Although a number of passes are closed during the heavy snow season, the main routes are kept open with but little interruption to traffic.

Costs

An ever-increasing public demand for immediate snow removal, regardless of the seasonal conditions encountered, has become a serious factor. Travelers have come to expect highways that can be traveled over at high speeds, in the winter time as well as in the summer, with the resulting increased cost for snow removal year by year.

The costs of snow removal are apportioned through the regular maintenance funds. Such funds are allocated from the highway fund on the basis of the estimated requirements for maintenance. The main sources of revenue to the highway fund are from the gasoline tax, motor vehicle licenses, motor carrier taxes, motor caravan taxes, and drivers' licenses.

The total cost of snow removal and ice treatment for the 1936-1937 season amounted to $355,126.17, which was expended by the state on 3,557 miles of highway.

An FWD Truck with Frink V-Plow and Wings Working Through a Snow Drift on the Clark's Fork Highway Between Dover and Sandpoint, Idaho

Organization

The regular maintenance personnel, augmented at times by additional laborers, is usually sufficient to keep the roads open.

It is customary for each District Engineer to assume active charge of snow

(*Continued on page 39*)

Tractor Front End Attachments

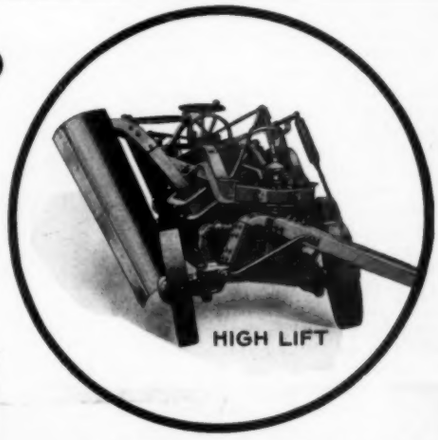
Write for Circular on types, sizes and prices

White Mfg. Co.

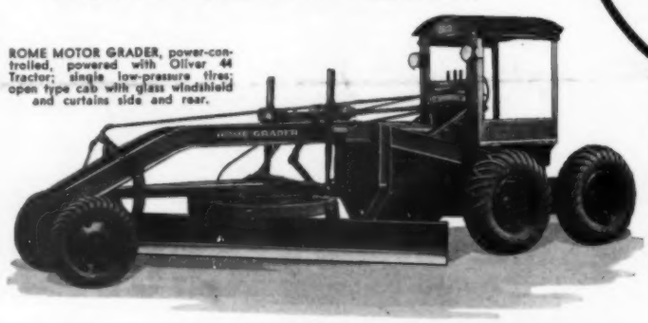
ELKHART INDIANA

• ROME • MOTOR GRADERS

When judging and comparing road building machinery, consider the standards of quality that have brought ROME Graders into so prominent a place. After all, the finished grader is made up of *assembled details;* and it is the character and perfection of these details that give ROME equipment its outstanding leadership.



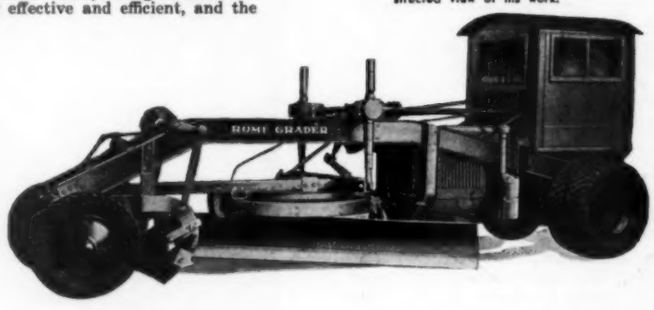
ROME MOTOR GRADER, power-controlled, powered with Oliver 44 Tractor; single low-pressure tires; open type cab with glass windshield and curtains side and rear.



The ROME is the original grader with the patented High Lift feature, enabling the operator to stand on his platform, turn the handwheels and set the moldboard at any angle he chooses, or easily adjust it from a ditching or grading position to a bank cutting position. The blade is adjusted to the high lift position in a jiffy, without the use of wrenches or other tools.

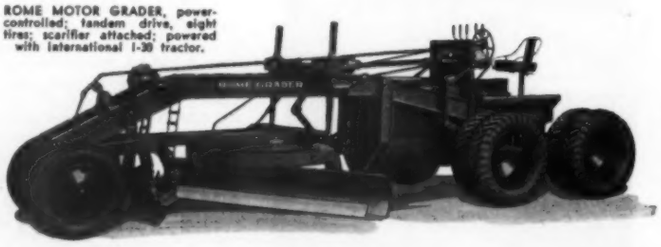
The moldboard on a ROME Grader is extra wide and properly concaved so that it rolls the dirt, rather than pushes it; and is so curved as to free itself from dirt at all times. Its extra width, strong construction and proper design make it unusually effective and efficient, and the maximum amount of work is secured.

ROME MOTOR GRADER, power-controlled; closed type cab; all levers within easy reach of the operator as he sits in the cab, with unobstructed view of his work.



ROME Motor Graders—sturdy and powerful, simple in design, rugged in construction, easy to handle, economical to operate—are always ready for all kinds of road work:—leveling, scarifying, scraping, grading, ditching, rooting, snow removal, etc.—from tearing up old pavements to bucking heavy snow drifts.

ROME MOTOR GRADER, power-controlled; tandem drive, eight tires; scarifier attached; powered with International I-30 tractor.



ROME Motor Graders are furnished in a number of sizes, either power or manual-controlled, and either single drive or tandem drive. They are powered with the well-known and universally used International, Case and Oliver tractors. Bulletins: No. 73, "ROME MOTOR GRADERS," and No. 75, "ROME High Lift Leaning Wheel Graders." Write also for Bulletin on "ROME AUTO-MOWER."

"The Best Bargain is Quality"

ROME GRADER AND MACHINERY CORP.

ROME, NEW YORK

New A.R.B.A. Officers

The new officers and directors of the American Road Builders' Association, elected at the Annual Convention in Cleveland last month for the year 1938-39 and who will take office at the Annual Meeting in May, are as follows: President, Murray D. Van Wagoner, State Commissioner of Highways of Michigan; Vice President, Northeastern District, Paul B. Reinhold, Secretary-Treasurer, Reinhold & Co., Inc., Pittsburgh, Pa.; Vice President, Southern District, E. D. Kenna, Director, Mississippi State Highway Department; Vice President, Central District, Lion Gardiner, Vice President, Jaeger Machine Co., Columbus, Ohio; Vice President, Western District, Stanley Abel, Supervisor, Fourth District, Kern County, Calif.; Treasurer, James H. MacDonald, Consulting Road and Paving Expert, New Haven, Conn.

The Directors will be A. W. Brandt, Commissioner of Highways, New York State Department of Public Works; Carl W. Brown, Chief Engineer, Missouri State Highway Department; Frederick Hoitt, Secretary, New England Road Builders Association; C. J. Sherlock, First Assistant Engineer, Alabama Department of Highways; Charles M. Upham, Engineer-Director, American Road Builders' Association; Charles D. Vail, Colorado State Highway Engineer; and H. C. Whitehurst, Director of Highways, District of Columbia.

Mall Takes Over Wappat

The assets, manufacturing plant and equipment of Wappat, Inc., Pittsburgh, Penna., have been purchased by the Mall Tool Co. of Chicago, Ill. The entire line of Wappat portable tools, consisting of saws, grinders and drills, will be manufactured with the same high quality materials and workmanship as before and will now be available from established distributors for Wappat or for the Mall Tool Co., or direct.

Sales Mgr. Moves to N. Y.

A. B. Dougall, General Sales Manager, Electric Hose & Rubber Co., of Wilmington, Dela., has moved his headquarters to the new Eastern Sales Office located at 9 Rockefeller Plaza, New York City.

SNATCHED FROM WINTER'S GRIP!

WINTER made a mess of things in New Mexico last year. But "Caterpillar" Diesel Equipment soon had the roads back to normal — without an abnormal outlay of time or money!

Above, you see a stretch of highway near Eaglenest. A "Caterpillar" D8 Tractor and a "Caterpillar" power-controlled Grader are working the road surface from side-to-side, so the sun and wind can dry it. A "Caterpillar" Auto Patrol follows — ironing-out the remaining wrinkles.

Two days after this, the road was dry! It looked like the piece a few miles away (shown in the picture at the right), where the same work had been done just two days before . . . and where a "Caterpillar" Diesel Auto Patrol is now putting on the finishing touches.

On this job, the machines, of course, used inexpensive Diesel fuel . . . only 6 gallons an hour for the D8 Tractor; and only 2 for the Auto Patrol.

When roads need to be built, reclaimed, or maintained —count on "Caterpillar" Diesel Tractors and "Caterpillar" Road Machinery to cut costs to the bone; count on them for traction and power; *and count on them to keep going with little or no time out for repairs!*

CATERPILLAR

REG. U.S. PAT. OFF.

TRACTOR CO., PEORIA, ILL.

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

Road Not Injured By Ice and Water

(*Continued from page 1*)

for the full width of 30 feet, using a 16-foot spray bar. The prime was allowed to cure for 10 days but traffic was allowed to use the road as there was no detour available.

Placing and Preparing Gravel

The contractor hauled in 7.6 yards of pit-run gravel with all over 1-inch stone screened out and all washed, 2.4 yards of coarse sand, 4.5 yards of fine sand and 2,500 pounds or 1 yard of 200-mesh stone dust per station. Each size of aggregate was dumped separately so that there were four rows of piles down the side of the road. A windrow evener was run down the piles to level them. This device is something like a stone sled with 10-inch boards on the sides and with a rectangular opening at the back so that the material is transformed from conical piles to a long wider flat pile.

Using a 12-foot Allis-Chalmers patrol grader and a Caterpillar Thirty-Five with a 10-foot blade, the material was moved across the road and back three times for mixing. The aggregate was left windrowed in the center of the road when it was considered sufficiently mixed. The windrow was then split in halves and each half spread 6 feet wide and about 5 to 5½ inches thick ready for shooting.

The first shot of MC-2 Texaco asphalt on the mixed aggregate was made at 0.65 gallon per square yard based on the 18-foot width of road, using the 10-foot spray bar on the 12-foot pile of aggregate. Two rounds of a 10-inch disc and spring-tooth harrow mixed the material considerably and made it a good consistency to mix with the blades.

Mixing

The Caterpillar Thirty-Five with a 10-foot blade started mixing by cutting off about 2 feet of the 12-foot pile on each trip and moving it well to the side. The material was continuously moved in this manner, 2 feet at a time, all to one side of the road and then given about six complete bladings across the road to mix it thoroughly. At first the contractor did not use the disc and harrow and he found that the blading required was excessive. This was cut down greatly by the preliminary treatment with the disc and harrow.

The Windrow Evener Combined the Piles Of Four Aggregates into One Windrow

After this mixing, the material was spread to a 12-foot layer in the center of the road and shot with 0.5 gallon per square yard of the same asphalt. The disking, harrowing and blading were repeated in the same sequence until this asphalt was thoroughly incorporated in the aggregate. It was found that the mixing after the second shot was faster than for the first shot. Also the weather was a trifle warmer in spite of the late awarding of the contract, and that may have been of some assistance. It is known that the cooler weather later greatly retarded the work and made the use of additional asphalt necessary.

The third shot of asphalt was at the rate of 0.15 gallon per square yard and the mixing was done as before. It was during early October when the last section on the south end of the 3½-mile job was being mixed that the weather cooled considerably and a fourth shot of 0.15 gallon of asphalt was given to the material to increase the workability of the mix.

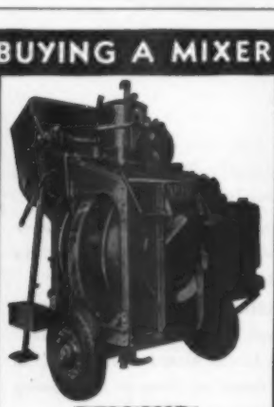
After the third, or fourth, shot had been mixed thoroughly and such dry spots as showed up had been shot with a little extra asphalt, the last mixed windrow was spread to 18 feet wide, giving a 2-inch compacted thickness. The surface was rolled the same day with a 5-ton Austin 3-wheel roller.

Seal Coat

A seal coat of 0.2 gallon per square yard was shot 11 feet wide down each side and lapped 1 foot over onto the shoulder. The road surface was then covered with hand-cast pea gravel at about 20 pounds per square yard and traffic allowed to use the road immediately. This was in October and the pea gravel did not stick to the asphalt seal

(*Continued on page 29*)

BUYING A MIXER?



DEMAND:

- Faster Charging and Discharge Speeds,
- Machined Steel Tracks,
- 2 Wheel Mounting with Timkens and Pneumatics,
- End Discharge Advantages,
- Man-Ten Alloy Steel,

Send for New Catalog, Prices 3½S to 56S Sizes.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

JAEGER

SNOW DRIFTS AHEAD

BUT...

a Clean Road Behind with a WALTER SNOW FIGHTER

Snow drifts to right of them; snow drifts to left of them; snow drifts in front of them; but nary a snow drift *behind* them. WALTER SNOW FIGHTERS are always spoiling Old Man Winter's fun, undoing the blizzard's mischief, taking the snarl out of winter traffic.

And what makes a WALTER SNOW FIGHTER such a blizzard-eater? *Four-Point Positive Drive*—that's what. Something no other vehicle has. For Walter automatic differential action between front and rear wheels and between right and left wheels maintains positive driving action on all four when it is needed most—on slippery ice and snow covered highways.

The Walter's three power-proportioning differentials divide the power so that the wheels with least traction get the least and those with most traction get the most power. That's what we mean by Walter 100% Traction.

And remember—when you're shoving snow drifts around, one horsepower *with* traction is worth a hundred *without*.

Send For Further Information.

MOTOR TRUCK CO. WALTER

1001-19 Irving Ave., Ridgewood, Queens, L.I., N.Y.

Stable Base Built The Road-Mix Way

(*Continued from page 2*)

MC-4 was applied at 2 gallons per square yard.

FAP 288C—3.049 miles on which for the first 1.05 miles MC-4 was applied at the rate of 2 gallons per square yard and the balance was shot with SC-3 at the same rate.

FAP 288D—3.058 miles in length, on the first 1.10 miles of which SC-3 was applied at 2 gallons per square yard; then 0.40 mile shot with 2 gallons per square yard of TM-2 tar; and the balance with SC-3 at 2 gallons per square yard. An extension to the original FAP 288D 0.2 mile in length was treated with SC-3 at 2 gallons per square yard. On the last 534 feet of the project at Glasgow there was a great deal of loess soil or river sand which seemed to need more asphalt so the amount of the bituminous material was increased to 17 gallons per cubic yard for this section. It proved to be a mistake as the cut-back did not cure out and the mix remained spongy and had to be removed and additional aggregate added and the material replaced in the road section.

A Barber-Greene road-mix machine was used for mixing the aggregate and bituminous materials. The machine straddled the windrow in the center of the road, leaving the two sides open for such traffic as had to use the road and the asphalt tank trucks servicing the mixer. The machine moved over the road at the rate of 4.5 to 5.4 feet per minute, mixing the windrow that it picked up with the predetermined amount of asphalt or tar. In addition, from 4 to 11 gallons of water per square yard of finished road surface, with an average of 8 gallons, was added to the material in the mixer. The larger amount was added when the material was unusually fine and dry. It was observed that the loess soil required less water for a workable mix than the clay or gumbo soils.

The Barber-Greene machine was run two shifts a day of 12 hours each with 14 men to the shift. Two men picked clods and roots from the windrow ahead of the road mixer, and then two men shoveled at the spiral feed to keep material within the two wings where the windrow was too wide. One man operated the mixer and an assistant did the oiling and greasing. There were two men on the asphalt hose, one on either side, but material was taken only from one side at a time. One man handled the water hose, attached to a 2-inch line laid along the shoulder as for concrete jobs, and supplied by a pump in various creeks along the right-of-way. Two men were used to clear the aggregate feed and the pug mill, and two men behind the machine cleared the trenches where they had been broken down or filled by the asphalt trucks. There was a water boy at all times.

The road mixer delivered the mixed materials in a windrow behind which was spread within 12 hours after mixing sufficiently to protect the side trenches for the thickened edge by filling them. The balance of the windrow was left in place for 48 hours to one week to cure before being spread to approximate section.

Immediately upon spreading the material it was compacted with a Bros pneumatic roller pulled by a truck and a Blaw-Knox sheepsfoot roller pulled by a Caterpillar Sixty. These were followed by the Austin-Western hydraulic-control 12-foot patrol to fill in the holes and produce a road surface with a 4½ to 5½-inch crown. The final rolling was with a 3-wheel Hercules roller. The use of the sheepsfoot roller was discontinued as soon as the impression of the feet was less than ¾ inch. The final rolling with the 3-wheel 7-ton roller was only to remove any waves in the surface. After approximately five days of curing, depending on the condition of the base material, a 10-ton Buffalo-Springfield gas roller was put on and the surface rolled to final compaction.

The Armor-Coat Surface

The road-mix stabilized base 20 feet wide was cleaned with a Hough power broom, before the application of the prime, to remove loose material and accumulated dirt not fully bonded by the machine mixing. The cleaning was followed by an application of 0.22 gallon per square yard of MC-2, using an 11-foot spray bar on the Etnyre distributor. This was allowed to cure for from 24 hours to 7 days and the tack coat of 0.35 gallon of RC-4 applied with a 10-foot spray bar. At first the prime was repaired where there were breaks caused by iron-tired vehicles but it was found that the second spraying did not dry out

(*Continued on page 22*)

New Two-Piece Dipper

A new two-piece body renewable-lip dipper, recently announced by the American Manganese Steel Co., Chicago Heights, Ill., is available in sizes from ¾ to 18 yards. In both the two and the one-piece bodies, the renewable lips dovetail into the front, are keyed to the front and held in position by U bolts through the back.

Amsco renewable lips are made in a variety of shapes, tapers and with various degrees of sharpness on the cutting edge, depending on the nature of the material to be dug.

Complete information on this new two-piece model, as well as on the other dippers of the Amsco line, may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

New Cummer Portable Asphalt Plant

Series 1200—for Hot and Cold Mix. Equipped with the Cummer Two-Fire Dryer Cooler.

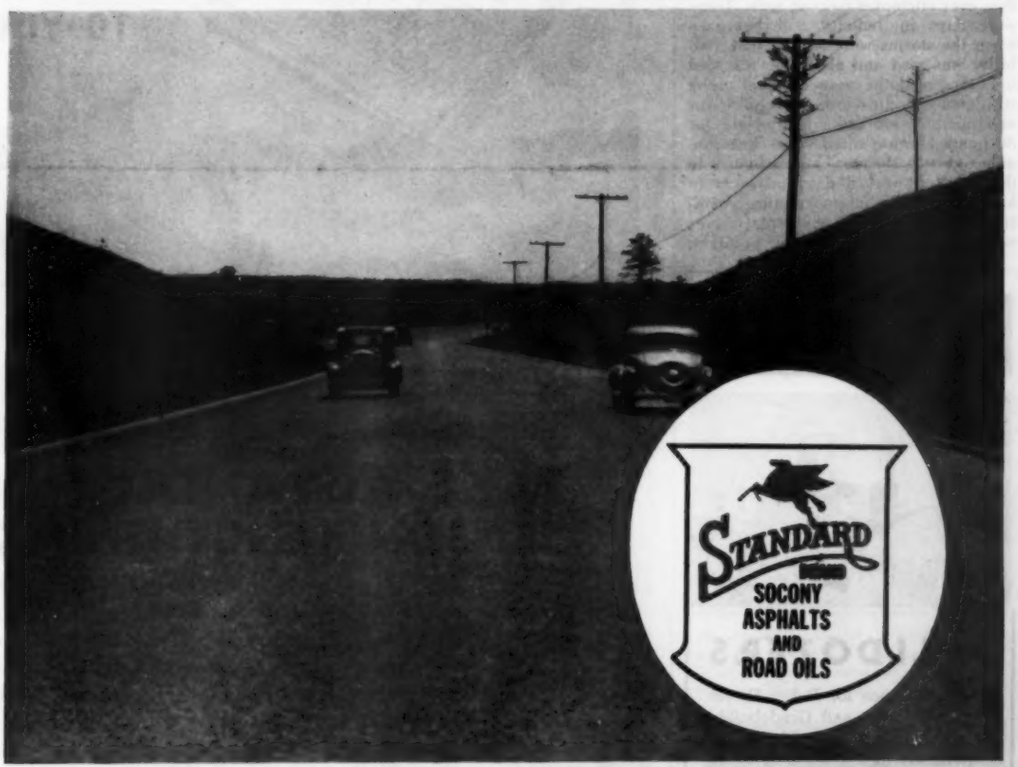
Series 920—for Hot Mix. Equipped with the Cummer Internal Fire Dryer.

Both plants are built with a new idea in tower units, for portability. Complete plant may be set up in 3-4 days. Supplied with 1, 1½ or 2-ton mixer.

Write for literature

THE F. D. CUMMER & SON COMPANY
17th and Euclid Avenue Cleveland, Ohio

ANOTHER GOOD ROAD MADE BY GOOD ENGINEERING AND GOOD PRODUCTS



Socony Paving Asphalt 51-60, Standard Brand. The "Skyway" along the Cape Cod Canal—Mass.

SOCONY Asphalt Road Oils • Socony Asphalt Joint Fillers • Socony Waterproofing Asphalt • Socony Cut-Back Surfacing Asphalt • Socony Asphalt Binder A for surface treatment • Socony Refined Asphalt for sheet asphalt paving • Socony Cold Patch Asphalt for all types of patching • Socony Asphalt Binders B & C for penetration work (Asphalt Macadam) • Socony Paving Asphalt 51-60 and 61-70 Penetration for the mixing method (Asphaltic Concrete) • *Specifications and all other particulars furnished on request.*

SOCONY-VACUUM OIL CO.
INCORPORATED
STANDARD OIL OF NEW YORK DIVISION

PICKS and SHOVELS

By O. E. POTTER

Unsung Heroes of Winter

Last winter was a comparatively mild one in the East and the many snow removal preparations inspired by the heavy snows of the preceding season were not required in many sections. But old Mother Nature seems to even things up, and the West which had been spared some of the extreme rigors of winter the year before had more than its share of snow problems to face.

All types of heroes have been glorified in song and story and in the films but it seems to us that not enough has been said about the men who fight cold and gales and snowdrifts in an effort to keep the highways open to the traveling public, the men who rescue stranded cars and break open roads piled high with drifts to get the doctor through to a solitary farmhouse where someone lies in urgent need of medical care, the men who suffer from frozen hands and feet and exposure and take it as all in the line of duty.

In Division No. 7 in Montana last winter, a total of 49 inches of snow fell in the vicinity of Havre and, compared with their past experiences, the winter of 1937 was one of the toughest they ever attempted to cope with. There were days in January and February when the storms were so bad that visibility was zero and all traffic was tied up. And still the snow removal crews struggled on. In one instance, a driver and operator worked continuously for 30 hours because relief crews were unable to reach them. The mechanics in the Division worked day and night to keep the equipment in running condition and necessary parts replacements were made on the road, day or night, regardless of the weather.

Strict orders were issued at the onset of winter by D. A. McKinnon, State Highway Engineer, and Scott P. Hart, Maintenance Engineer, that every possible effort was to be made to keep the roads open and to relieve suffering. These orders were followed at all times if humanly possible. Highway Department trucks assisted county crews in giving aid to stranded ranchers and by keeping coal-mine roads open. Several days were spent in opening approximately 40 miles of road in the Fort Belknap Indian Reservation, making it possible to transport food and supplies which were sorely needed. Help was given to many stranded parties and in one case, with below-zero weather, a man who had wrecked his car and was badly injured was picked up and taken immediately to a hospital.

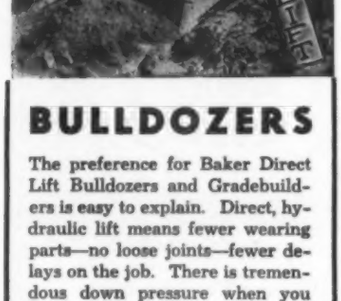
On the night of January 23, reports H. J. Price, Maintenance Foreman of Division No. 7, a sudden storm from the north caught many people on the highways. With visibility low, trucks

When It's Snowtime in the Rockies. Lines Show Location of a Highway in Montana

were immediately sent out to clear the highways. The storm was raging from the north when a truck came upon what the driver thought was a stranded car. Upon investigation he found that a trailer had been left in the center of the road. A horse covered with snow and his tail to the wind was tied to the trailer. An open bale of hay lay on the road, apparently left for feed and bedding by a bewildered owner. Just another problem for one of the snow removal crew to solve! Further along the highway, the driver came upon a car, with five people in it, headed west and stalled in a snow drift. The Highway Department truck driver

(Continued on page 26)

BAKER



BULLDOZERS

The preference for Baker Direct Lift Bulldozers and Gradebuilders is easy to explain. Direct, hydraulic lift means fewer wearing parts—no loose joints—fewer delays on the job. There is tremendous down pressure when you need it and rugged strength for the toughest jobs.

BAKER TRACTOR EQUIPMENT
BULLDOZERS
GRADEBUILDERS
ROAD ROOTERS
TRACTOR SCRAPERS
ROAD DISCS
MAINTAINERS
SNOW PLOWS

Ask for Bulletins on Baker Bulldozers and other Baker Tractor Equipment

THE BAKER MFG. CO.
585 Stanford Avenue
SPRINGFIELD, ILL.

TAKE ADVANTAGE OF THESE SEASON LENGTHENING FEATURES

Start applying bitumen on your roads earlier this year. Work later next fall. Make up for the days you lose due to bad weather during your busy season. Those extra days will bring increased profits. You can apply many more gallons per season with this Model "C" Distributor.

How are you to add these extra days?

Use the pressure distributor with the fastest, safest heating system—The Littleford Model "C." On cool days when heavier materials freeze up in most distributors, your Littleford Model "C" will go right along without delays. Bitumen will not freeze up in the lines because they are protected.

The Littleford Model "C" is the only distributor having the LB Low Pressure forced draft burner and continuous heat flue. It has seven full sized heat tube passes. This heating system heats up a tankful of heaviest bitumen 3 to 5 degrees F. per minute. Furthermore, the Heat Chamber in the Littleford Model "C" thaws out the pump, valves and lines from a cold start in less than 5 minutes.

These advantages enable you to be working on the road with a Littleford Model "C" days earlier and weeks later than is possible with any other distributor.

This FREE Book tells *Why!*

LB LITTLEFORD
BACK TO ROAD MAINTENANCE EQUIPMENT
SINCE - 1900
LITTLEFORD BROS.
485 EAST PEARL STREET
CINCINNATI, OHIO

Ask for this Bulletin M-14 which contains a complete story on the heating system and thawing chamber in the Model "C" Distributor. No charge. No obligation. Free to owners and operators of Pressure Distributors.

Loading an Industrial Tractor on One of the New M-B Model 3000 Trailers

New Platform Trailer

A new platform trailer for transporting machinery and materials, a feature of which is that it tilts to expedite loading, has been announced by the Meili-Blumberg Corp., Box C-1, New Holstein, Wis. This Model 3000 supplements a lighter 1½-ton model previously announced.

The new trailer has been completely redesigned but retains the features of dual wheels and the low unobstructed 8 x 14-foot tilting platform. It is claimed to be capable of hauling all types of contractors' equipment, such as pumps, compressors, sawrigs, etc., and can be towed behind autos or light pick-up trucks. The dual wheels are equipped with 7.50 x 16.00 tires.

Features claimed for this new trailer are quick, easy tilting for loading; automatic leveling when the load is balanced; platform locked while in transit; rugged, welded steel frame; and no side sway or rim racking. Electric brakes, winch and stake pockets are available as optional equipment.

New Diesel Tractor Exhibited at Road Show

Among the equipment displayed at the International Harvester Co. exhibit at the Road Show in Cleveland was the recently developed TD-35 TracTracTor, powered by a 4-cylinder diesel engine. This new crawler tractor has a variable-speed governor, 5-speed transmission with forward speeds of 1¾ to 4 miles an hour and 2¼ in reverse, ball bearings at 43 points, replaceable cylinders, Tocco electrically hardened crankshafts, special dust seals, fuel strainer, air cleaner, oil filter and unit construction throughout, permitting the removal of important working parts as units and making adjustments and replacements possible in the minimum amount of time.

The track face of the regular shoe is 13 inches, the track tread on the standard-tread model 45 inches and on the wide tread model 56 inches; the track ground contact 64⅜ inches; the total length 132⅛ inches and the total width of the standard-tread model 58¼ inches.

As in other International Harvester diesel engines, the engine in the TD-35 TracTracTor is provided with a distinctive system of starting by which it may be converted into a conventional gasoline engine at first to facilitate starting. After a minute or less of gasoline operation, a quarter turn of a small crank reduces the compression chamber to the size for diesel operation, shuts off the gasoline, and starts the diesel fuel injection, using low-priced fuel oil without carburetor, magneto or spark plugs.

Complete information on this new TracTracTor may be secured direct from the International Harvester Co., Inc., 180 No. Michigan Ave., Chicago, Ill.

Line of Modern Wheelbarrows

The American Deluxe wheelbarrows, made by the American Steel Scraper Co., Sidney, Ohio, are featured by their design, as a result of which the load is on the wheel. The axle bracket lifts the frame from 3 to 4 inches higher than usual, permitting the tray to be placed forward and resulting in the load being on the wheel and not on the operator.

The tray is both riveted and welded and is water-tight. It rests on an extra bottom-plate securely fastened to the chassis, making a rigid frame. Handles are made of select material and the wheel is pneumatic tired.

Complete information on these wheelbarrows, which are designed to minimize fatigue on the part of the operator, thus speeding up work as well as decreasing the possibility of accidents, may be secured direct from the manufacturer.

MALL CONCRETE VIBRATORS and SURFACERS

The Same Power Unit Can Be Used For Both Operations

A few minutes' time spent in comparing MALL Concrete Vibrators with other makes may save you hundreds and possibly thousands of dollars on your next job.

We'll gladly send you bulletins on the gas engine, air, and electric models without obligation. You'll find the reasons why contractors and engineers all over the world have bought MALL vibrators in preference to all others.

Save Time and Cut Costs!

The MALL Electric Handsaws are built of the highest quality to the specifications of carpenters and contractors. It will pay you to investigate these money saving tools.

MALL TOOL COMPANY, 7743 South Chicago Avenue CHICAGO, ILLINOIS

OFFICES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD

ALL STEEL HAND HOIST

SEATTLE, U.S.A.

COMPACT—POWERFUL—SAFE

"For use where power is not practical or available"

Manufactured in 2, 5 and 15-Ton Sizes. For capacity comparison, ½" cable used:

2-Ton "Lightweight" ..... 75 ft.
5-Ton "General Utility" ..... 250 ft.
15-Ton Triple-Geared "Special" ..... 1200 ft.

Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price
2-Ton 4 & 32 to 1	60 lb.	$80
5-Ton 4 & 24 to 1	110 lb.	$75
15-Ton 4, 19 & 109 to 1	680 lb.	$200

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2724 6th Ave., So., SEATTLE, WASH.

Warehouse stocks for dealers' supply: Seattle—Chicago—Brooklyn—Houston. Complete Literature and List of Dealers in Principal U. S. Cities and Foreign Countries Gladly Mailed.

WARCO WINS AGAIN

With the finest line of new equipment on the market

Outstanding Stability is the feature that helped WARCO Equipment win its present favorable reputation for Satisfactory Performance, Economy and Ease of Operation.

Whether Rear or Center Controlled Motor Grader, Drawn Grader, Roller, Wheel Scoop or Tandem Drive, WARCO Equipment is built to withstand the rigors of constant use without the loss of time and annoyance of breakdown and repair worries.

WARCO modern Motor Graders are made in several sizes and models to suit your requirements, and possess desirable features not found in the conventional Motor Grader. The patented Spring Stabilized Front End enables the operator to eliminate side sway and regulate the oscillation of the front axle in such a manner as to enable him to maintain roads at a higher speed than heretofore deemed possible.

The Two-Speed Mechanical Power Control System will produce conventional or higher speed movements to all controls.

The patented Two-Speed feature is also used in the control system of the new WARCO Ranger, 10 ft. Tubular Frame Drawn Type Machine. The Tubular Frame Construction also affords greater strength, greater visibility, and a wider range of all conventional movements.

If you want Real Equipment, BUY WARCO!

SPEED ROLLER

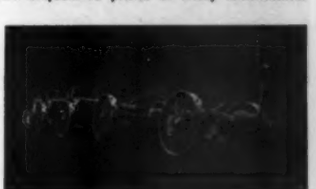
The WARCO Whizzard All-Purpose Roller is designed for conventional weight and speed, while Rolling, and quick transportation from job to job.

PULL GRADER

The New WARCO Power Controlled, Tubular Frame, Leaning Wheel, High Lift, Blade Grader affords greater strength, greater vision and greater range of all controls.

CENTER CONTROL GRADER

The Ever-reliable Center Control Model "H", equipped with WARCO Octopus (8-Wheel) Drive, for heavy construction work, has won the unqualified praise of many contractors.



WHEELED SCOOPS

WARCO Wheeled Scoops operated in trains behind any standard make crawler tractor on an excavation or fill will move dirt with surprising rapidity and gratifying economy.

W. A. RIDDELL CORPORATION

BUCYRUS - - - OHIO

Big Rock-Fill Dam For Southern City

(*Continued from page 2*)

Details of the Inland Dam

The site of the dam near Inland, Ala., was stripped to sandstone and a 60-inch steel pipe laid through the dam in the rock and concreted in for the delivery of water to the Birmingham line. The cut-off walls are carried 2 feet into rock and are a total of 5 feet high with a 2-foot top width and a batter of 1 inch per foot. The first cut-off wall is on the intersection of rock and clay fill and a second has been built 100 feet upstream, running into the shale 80 feet above the river bottom.

The dam has a 30-foot crest and was built with three graded sizes of rock and a clay fill. Upstream of the center line, crushed rock, from a quarry on the site, measuring from 3-inch down to ½-inch, was placed on its natural slope. Downstream of the center line, 3-inch up to 15-inch rock was placed on its natural slope. The upstream rock is covered with a blanket of screenings and over that a compacted layer of impervious clay on a 3 to 1 slope. A hand-placed riprap paving of quarry-run stone covers the clay fill. The dam has 16 feet, vertical measurement, of freeboard paved with riprap on a 2 to 1 slope. The clay was placed on the face of the dam in 6-inch layers of selected material rolled with sheepsfoot rollers and tests made constantly to insure that the clay had from 11 to 22 per cent moisture to insure maximum compaction.

The lower face of the dam, the downstream side, is of quarry-run stone placed on a 2 to 1 slope. This type of construction with an impervious upper stratum and an open lower face prevents any concentration of water and hence protects the stability of the dam.

The diversion of the Little Warrior River during construction was handled in a novel manner. The spillway structure consists of an arched concrete wall 510 feet in length capable of passing the greatest flood known to have occurred on the watershed with a good measure of safety. A shaft 22 feet in diameter with a 40-foot bell mouth runs from the spillway section vertically for a distance of 170 feet to a horizontal tunnel which carries the water to the old stream bed. A temporary diversion tunnel was driven for 550 feet at an angle of 92 degrees 30 minutes with the outlet tunnel to carry the river. The tunnels are all through sandstone and the permanent tunnel and the shaft are lined with 12 inches of concrete while the temporary diversion tunnel was lined with 6 inches of concrete and was plugged when the dam was completed. The outlet tunnel was driven on a 0.1 per cent grade toward the outfall.

Another feature of the structure is the emergency spillway. This feature is provided in case the well-constructed protective structural screen around the spillway should give way and permit logs and trash to accumulate across the top of the shaft and reduce its capacity during a major flood. The emergency spillway at the opposite end of the dam has a concrete crest 4 feet lower than the crest of the permanent spillway, with an earth dam superimposed to a height 6 feet greater than the permanent spillway and 10 feet lower than the top of the main dam.

C. & E. M. Photo

All Rock for the Inland Dam Was Crushed and Screened at the Site in This Large Temporary Plant

Quarry for Rock for Dam

All of the various sizes of rock for the main dam were quarried at the site and a complete crushing and screening plant was erected. The sandstone quarry was located at the west end of the dam where coarse grained material varying from soft to hard is available. Care was taken in using only the best grades of rock for the structure. The drilling for quarrying was done with two Keystone and one Cyclone 6-inch well drills. They worked to the bottom of the sandstone

(*Continued on next page*)

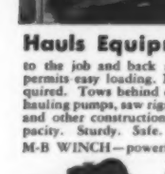
For the Thrifty Contractor

MB Tilting Platform TRAILER

Hauls Equipment Faster

to the job and back again. Tilting feature permits easy loading. No skids or planks required. Tows behind car or truck. Ideal for hauling pumps, saw rigs, tractors, compressors, and other construction equipment. 5-ton Capacity. Sturdy. Safe.

M-B WINCH—powerful, double reduction, two speed. For truck or trailer. Low cost.



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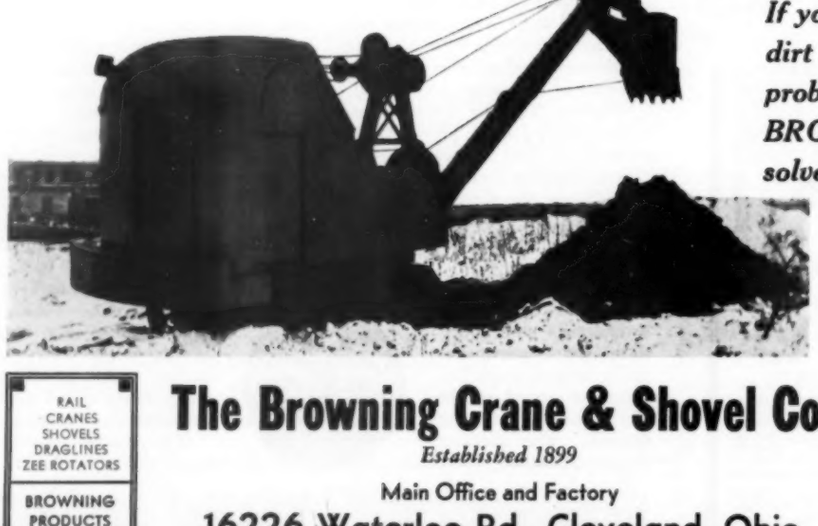

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CRAWLER, TRUCK AND WAGON SHOVELS DRAGLINES CRANES - HOES

BROWNING PRODUCTS

DIESEL GASOLINE STEAM ELECTRIC

Large Water Supply From Rock-Fill Dam

(*Continued from preceding page*)

at depths of 80 to 100 feet. The quarry face when fully opened was about 1,000 feet in length. The blasting was done with 75 per cent dynamite and Gelamite loaded alternately in the holes and firing was done with Cordeau detonating fuse shot by machine.

At first, before the exact character of the rock was determined, there was a considerable amount of block-holing necessary but as the work progressed this was practically eliminated. The rock was loaded into eight Athey 13-yard side-dump quarry wagons pulled either singly or in tandem by RD8 tractors. Loading was done with a 100B Bucyrus-Erie 3½-yard steam shovel and a 120B Bucyrus-Erie 4-yard machine. The wagons delivered the rock to the primary crusher at quarry floor level. The quarry was worked in two levels, necessitating a steep down-hill haul with the loaded wagons for the early part of the work.

Crushing and Screening Plant

The rock was dumped into a steel-faced hopper above a 60-inch x 14-foot crawler-type Kennedy feeder which delivered the rock at a uniform rate to the Kennedy 48 x 60 jaw crusher. The crusher-run material then dropped onto another feeder of the same type, measuring 48 inches x 8 feet, delivering to a 36-inch Kennedy-Van Saun belt conveyor 186 feet between centers which carried the rock to a grizzly at the top of the screening plant. The grizzly threw out all material over 6 inches, sending it to a bin from which the material for the secondary crusher was drawn. Beneath the grizzly was a 4 x 14-foot double-deck vibrating screen with a 4 x 10-foot single-deck screen below to rescreen the ½ to 3-inch rock. The three bins for storage held the Class B rock, from 3 to 15-inch material, which was rescreened on the 4 x 10-foot screen to remove all the fines; the Class C rock, from ½ to 3-inch, which was hauled to the dam or fed to the secondary crusher; and the screenings used for the blanket beneath the clay.

The secondary crusher was a 20-inch gyratory of the same make which delivered the crusher-run material to a 24-inch belt 150 feet long which carried the material to the main 36-inch belt, forming a closed circuit.

The bins were of crib-type construction, using 4 x 8's with steel I beams on the outside for reinforcement at the mid-points of the timbers.

The crushers and belts were all individually powered with electric motors as follows:

Primary crusher	200-hp General Electric motor
Secondary crusher	100-hp General Electric motor
Vibrating screens	7½-hp Star motor
36-inch conveyor	30-hp General Electric motor
24-inch conveyor	25-hp General Electric motor
Large feeder	25-hp General Electric motor
Smaller feeder	10-hp General Electric motor

An Ingersoll-Rand Carpuller electric hoist was installed for dislodging rocks in the feeder to the primary crusher.

A fleet of six 8-yard International trucks hauled the rock from the bins to the dam and five 3-yard Internationals handled the smaller rock.

Four Ingersoll-Rand Type 40 compressors of 360 cfm each, driven by 75-hp General Electric motors through V-belt drives, furnished air at 100 pounds pressure for the drills from a central compressor house.

As dust seemed to be the rule of the road on the quarry floor, sprinkling trucks were pressed into service to make the road safe for fast operation. Another item of more than passing interest is that the steam rigs all secured their coal within ¼ mile of the job from a small local mine. During the spring when the roads became practically impassable to all but horse-back riders the steam shovels stripping on the east end of the dam used coal from a fairly good quality seam encountered above the sandstone for a few days until deliveries were resumed from the local mine.

The job was run with three 8-hour shifts for a total of 40 hours a week per man. The Sunday shift handled only repair and maintenance. For the night shifts the job was well lighted with pairs of 1,000-watt lights on poles at strategic points. A 1,200-foot ⅜-inch messenger cable strung over the center line of the dam carried pairs of 1,000-watt lights which could be pulled back and forth to concentrate the light where most needed.

Aggregate Plant for Concrete

Aggregate for all the concrete on the job was produced at a plant on the site using the sandstone from the tunnel excavation. This high-silica sandstone is of unusually high quality for concrete aggregate in this territory. The stone was hauled direct from the tunnel by Western dump cars on industrial track, using two 7-ton Whitcomb locomotives and one 8-ton Davenport. When the tunnel rock exceeded the capacity of the plant for production and before the plant was ready for service the rock was stockpiled alongside and was retrieved by using one of the Conway muckers released from tunnel work to load the Westerns and trucks. These units hauled to the 12-inch Kennedy gyratory crusher which delivered the crusher-run material to a bucket elevator carrying it to the screens where it was sized to a 3 to 1½-inch bin, a 1½ to ¾-inch bin and a ¾ to ⅜-inch bin. The oversize and the 3 to 1½-inch material was drawn to the secondary No. 19 fine-reduction gyratory crusher for the production of sand for the concrete. This material went to the same bucket elevator and back to the screens. The No. 19 made from 25 to 35 per cent of the sand required and the balance was imported from Plantersville, Ala., coming in by rail, and was unloaded by a Browning steam locomotive crane and ¾-yard clamshell to a separate bin from which it was batched separately. The primary crusher had a built-in 50-hp Kennedy synchronous motor and the secondary a 40-hp General Electric motor.

Beneath the bins and at ground level were five Blaw-Knox weighing batchers which delivered their materials to a 24-

(*Continued on page 32*)

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WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
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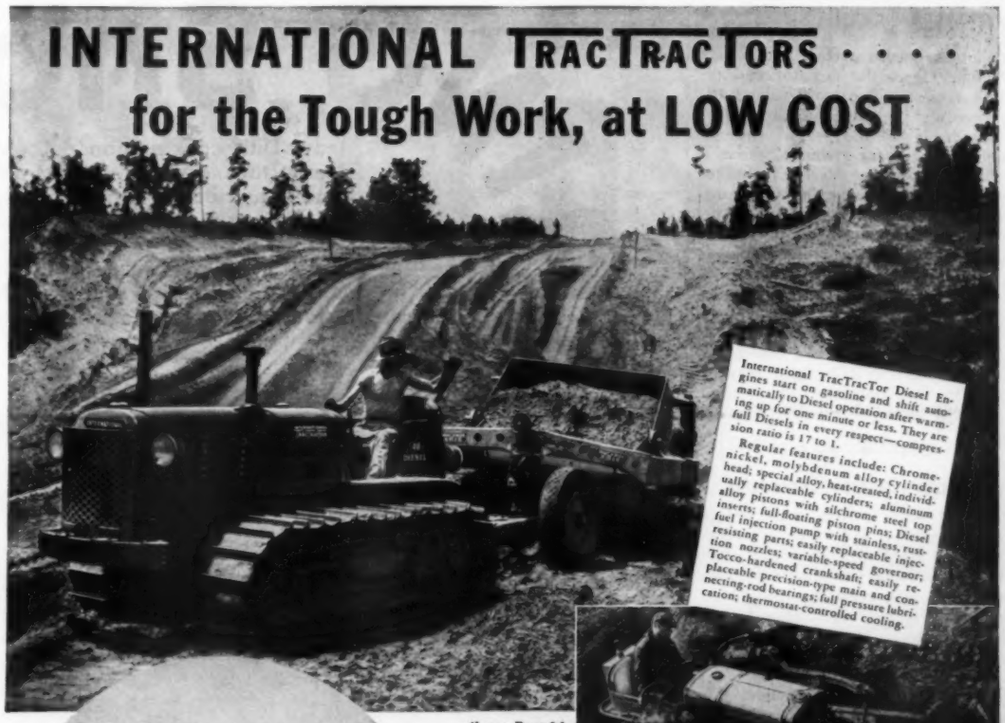
for the Tough Work, at LOW COST



International TracTracTor Diesel Engines start on gasoline and shift automatically to Diesel operation after warming up for one minute or less. They are full Diesels in every respect—compression ratio is 17 to 1.

Regular features include: Chrome-nickel, molybdenum alloy cylinder head; special alloy, heat-treated, individually replaceable cylinders; aluminum alloy pistons with silchrome steel top inserts; full-floating piston pins; Diesel fuel injection pump with stainless, rust-resisting parts; easily replaceable injection nozzles; variable-speed governor; Tocco-hardened crankshaft; easily replaceable precision-type main and connecting-rod bearings; full pressure lubrication; thermostat-controlled cooling.

Above: Powerful International TD-40 Diesel TracTracTor operating a 4-wheel scraper. A popular combination on dirt-moving jobs everywhere.

The International T-20 TracTracTor equipped with bullgrader. Shown on excavation work, a job for which this compact outfit is ideally suited.

MODEL TD-35 DIESEL
TRACTRACTOR

The popular features of International Diesel design are now available in the new International TD-35—a smaller Diesel TracTracTor at a lower price. Complete information supplied on request.

INTERNATIONAL TRACTRACTOR design, quality, performance, and economy offer the answer to your power problem. Make a thorough study of the TracTracTors — there are five models, to fit your needs exactly. Ask for a demonstration. The International line also includes a wide variety of wheel-type industrial tractors, and power units in sizes up to 110 max. h. p. The nearest International Industrial Power dealer or Company-owned branch will give you complete information on any tractor or power unit in the line.

INTERNATIONAL HARVESTER COMPANY
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180 North Michigan Avenue Chicago, Illinois
INTERNATIONAL HARVESTER *Quality* PRODUCTS

INTERNATIONAL Industrial Power

The New GMC 1¼-Ton Truck

Light-Duty Trucks Have New Engines

The three new light-duty trucks added to the 1938 GMC line are equipped with an entirely new engine of 223 cubic-inch displacement. This engine, which furnishes the power for the GMC ½-ton as well as the new ¾, 1 and 1¼-ton trucks, has been engineered especially for light, rapid service.

The water jackets of the new 223 engine have been extended the full length of the cylinders, providing adequate cooling under the most severe operating conditions. Valves are cooled by a gusher system that brings cool water from the radiator and directs it against each exhaust valve port. The necessity for valve seats is said to be eliminated by the use of chrome-nickel alloy iron for cylinder head and block. All moving parts, including piston pins and connecting rods, are lubricated by a complete pressure system. A special feature is a device for metering oil flow, preventing the flooding of any one bearing. Correct spark timing for any speed or engine load is provided by a vacuum-controlled distributor.

Complete information on these new trucks and the new 223 engine may be secured by those interested direct from the General Motors Truck Co., Pontiac, Mich.

A New Jaw Crusher

The first major change in the design of its jaw crushers since their inception in 1906 has just been announced by the Universal Crusher Co., Cedar Rapids, Iowa. This new crushing unit has a streamlined frame, with approximate weight savings of 20 per cent over conventional types of crushers, according to the manufacturer.

Complete details on this new jaw crusher are contained in a recently issued bulletin, copies of which may be secured direct from the manufacturer by mentioning this magazine.

Portable Automatic Asphalt Patch Plant

The type R-400 automatic portable patch plant made by Hetherington & Berner, Inc., Indianapolis, Ind., incorporates a number of features which are of particular interest to state and county highway departments. The plant has ample capacity for patch and maintenance jobs and even for some paving jobs as it will handle 400 yards per day. Cold material fed into the feed hopper is not touched again until it is discharged as finished material from the mixer end of the plant.

The plant has one hot and one cold elevator and the drier drum is heated internally by fuel oil through a combustion chamber. The asphalt kettle, mounted on the machine, has its own fuel oil burner for heating. The fuel oil tank for all of the burners is mounted at the rear and near the top of the plant. The aggregate bin has a capacity of 5,000 pounds; the hot-material bin, which has partitions, has a capacity of 3,100 pounds; and the lime-dust bin a capacity of 1,600 pounds.

The asphalt flows by gravity from the asphalt kettle to the weigh bucket which is suspended from a beam scale and the aggregate weigh box is suspended from a cabinet beam scale. A rugged double-shaft pug-mill-type mixer at the bottom of the plant gives thorough mixing before discharge of the material onto the roadway or into wheelbarrows. The plant is driven by a gasoline engine or electric motor and the total shipping weight is approximately 16,000 pounds. The unit, which is a straight-line plant mounted on a rigid-steel trailer frame with rubber-tired wheels and conforms to highway and street regulations, has a short turning radius. Also, a stationary-type unit mounted on a steel frame is available. It will mix black base or binder as well as patching material and can also be used for cold mix.

B-E Branch Office Moves

The Bucyrus-Erie Co. of South Milwaukee, Wis., has announced that its San Francisco office, formerly located at 989 Folsom Street, has been moved to 390 Bayshore Boulevard.

Waterproofing Against Hydrostatic Pressure

A new waterproofing method has been announced by Flexrock Co., 800 N. Delaware Ave., Philadelphia, Pa. It is claimed that this new liquid product, when mixed with ordinary raw portland cement, rolled into a carrot shape and pressed into the leak or broken place where water may be flowing through, will set in 30 seconds and stop the leak directly against hydrostatic pressure. It is further stated that this will provide a permanent repair.

Flexrock Flextite comes in 55-gallon or 30-gallon containers. One part portland cement, two parts sand and a gaging water of Flextite mixed with about 10 to 15 parts of water make a plaster coat over which plaster may be spread.

"A BIG YEAR"

A big year for "FLEX-PLANE" finishing machines, joint installing machines and dowel rod spotters is here. Please place orders as early as possible.

FLEXIBLE ROAD JOINT MACHINE CO.
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Heavy Duty construction in Koehring Shovels means Heavy Duty service under the most severe operating conditions. Be certain of steady production when the digging is tough. Koehring Shovels are built to give that extra service which assures high yardage. Low maintenance cost and continuous operation assure job completion with a profit. When you have a tough digging job, investigate the Koehring.

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Railroad Underpass With Precast Slabs

Baker & Forrest Cast Huge 108-Ton Blocks for Span of Canadian National Ry. Over N. H. State Rt. 110

(*Photo on page 44*)

✦ A NEAT grading job, good concrete abutments and careful underpinning of a heavy traffic single-track line all paled into insignificance beside the finale of the Baker & Forrest contract north of Groveton, N. H. On November 14, 1937, the job was successfully completed by swinging the two 108-ton precast slabs into place with the aid of two of the largest railroad wrecking outfits available in New England.

The Precast Slabs

The new underpass replaces an old grade crossing over a 12-foot embankment with S-curve approaches. Before the abutments were even excavated the pair of heavy reinforced slabs that make up the span for the new structure had to be cast and allowed to cure preparatory to being placed in position. This type of construction was chosen because of the proximity of the river and the need for maximum clearance with the highest possible elevation of the roadway without disturbing the grade of the railway. The total absence of ballast on the slabs was of great assistance in fulfilling these requirements.

To insure an adequate foundation for pouring the heavy slabs which had to be accurate because of the fastening of the rails, one rail on each slab, direct to the concrete without ballast, six pieces of 10 x 10 were laid lengthwise, and then crossed with 4 x 6's on 12-inch centers and 2-inch plank laid lengthwise and covered with $\frac{3}{16}$-inch Prestwood for the bottom and also for the lining of the sides of the forms.

The slabs are 65 feet 8½ inches long, 6 feet 6 inches wide and 3 feet 6 inches deep, each with a step joint. As cast, the long dimension of the slabs was parallel with the railroad track and about 5 feet from the nearer rail to the near form. The two slabs were cast with a step joint, the nearer slab being separated from the farther merely by a ¾-inch board and the farther slab rested beneath the nearer for the 3 inches of the step. This made necessary a special movement of the nearer slab before the farther slab could be swung clear for placing in position first.

With the absence of ties and ballast on the slabs the tracks were held in position by pairs of bolts which held the clips of the tie plates. These 528 bolts were set in position for casting by a wood template made up with great accuracy on the job. Each slab contains 22,000 pounds of reinforcing steel and has four lifting stirrups, two at each end of the slab so positioned that the slab would swing perfectly horizontal laterally when lifted by the wrecking cranes. As the two slabs measured 13 feet wide and the space between parapets was only 13 feet 2 inches, the slabs had to swing true for placing.

In order to insure the uniformity of the slabs they had to be poured monolithic, requiring a longer time than desired because a 2-bag mixer was used. The layers were poured very thin to insure that the concrete would not have its initial set before the next pouring over a given section took place. For curing, the slabs were covered with 6 inches of sand on top and the sides protected by Sisalkraft paper. The design of the slabs was made by the Canadian National Railway and the concrete work for the entire project was under constant inspection by a representative of the railroad in addition to the Resident Engineer of the State Highway Commission.

U. S. B. P. R. Photo

Precast Slabs Before Moving, Showing the Tie Plate Clips and Lifting Stirrups

Placing the Precast Slabs

At exactly 7 A.M. on the morning of November 14, 1937, the pair of huge wrecking cranes, a 120-ton machine of the Boston & Maine Railroad with its locomotive and a 150-ton wrecking crane of the Canadian National with its locomotive stood by for the first lift of the slabs. The nearer slab had to be raised

(*Continued on page 34*)

Concrete VIBRATORS
AND GRINDERS
Write for Circular on types, sizes and prices
White Mfg. Co.
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CUT COSTLY
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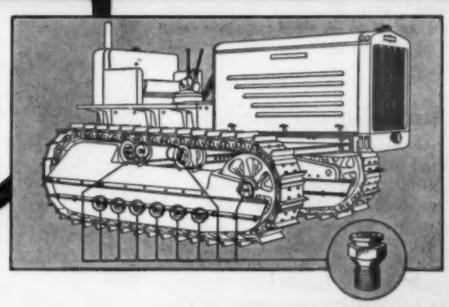
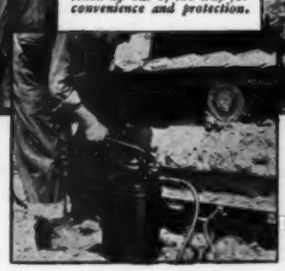
No Other Lubricant Pump Has All These Time-Saving Features





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← Pressure Instantly Released—*Patented pressure release feature releases pressure at any point during the stroke, so handle may be easily returned to carrying position.*

Convenient to Carry →—*See how easily the Alemite Volume Pump is carried; oval shape prevents interference with legs; hose is fastened up out of the way for convenience and protection.*

Double Action Saves Time—*Pumping* → *lubricant on both up and down strokes, the double action of the Alemite Volume Pump does the job in half the time required by old-fashioned pumps. The foot stabilizer holds the pump in place.*

LET the amazing new Alemite Volume Pump cut your tractor track roll lubrication time — releasing these expensive machines for *more hours of productive time every day!* No other pump has the famous Alemite double-action, forcing lubricant under pressure with both up and down strokes! Large filler opening *does away with spilling of grease while filling.* Heavy welded steel construction keeps the Alemite Volume Pump *leakproof* under the severe punishment of contractors' use. Oval shape makes it easy to carry — carrying handle fits hand, and hose is up out of the way, fastened to a fitting on top of the pump.

See your nearest Alemite Jobber or write direct to us for complete description and prices.

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WORLD'S LARGEST MANUFACTURER OF LUBRICATION PRODUCTS

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Stable Base Built The Road-Mix Way

(*Continued from page* 15)

rapidly and it tended to soften the tack coat.

Immediately after the application of the tack coat, a cover was spread by backing trucks onto the material and laying down 25 to 26 pounds of pea gravel, and up to a maximum of 29 pounds with a 10-foot Buckeye spreader box. This was followed by hand spotting where the material seemed to be thin so that the net cover averaged about 27 pounds per square yard. A V-shaped rattan drag broom was then pulled over the surface to spread the pea gravel more uniformly. It was pulled with the point of the V forward and the result was that too much of the gravel was pushed toward the edge of the surface and lost. This was corrected by pulling so that the legs both moved the pea gravel toward the center of the road. The drag broom was made of 14-inch hand brooms with the handles removed and the backs of the brooms nailed securely to boards. The broom was pulled by a 10-20 International Harvester pneumatic-tired tractor and was followed up by one rolling of the 7-ton roller. After the road had been open to traffic for a short period, considerable of the pea gravel was whipped to the shoulders. The power broom was used to move it back onto the road so that it would tend to key into the bituminous material and give further strength to the armor coat.

A portion of this contract was set aside for the use of cotton fabric reinforcing which will be described in a separate article as the work was the first of this type in Missouri and the mistakes made were important in leading to better work on this type of surface on the contract north of Keytesville which was started later.

Personnel

The contractor for the four Federal-Aid Projects was S. G. Hayes & Co. of Jefferson City, Mo., for whom Charles Chockley was Superintendent. For the Missouri State Highway Department, N. F. Tamm was Project Engineer with C. W. Eshbough as Inspector.

New Small Diesel

A new small diesel engine of the conventional stationary type, designed for use with a 3-kw generating set and similar applications, has just been announced by the Stover Mfg. Co., Freeport, Ill. This new 5-hp unit has a 3⅞-inch bore and 5¼-inch stroke, is equipped with a Bosch-Aero injection system, self-starting equipment, and has one fly wheel, leaving the opposite end of the shaft open for mounting a generator or any other driven equipment, or for mounting friction clutch pulleys.

Complete information on this new diesel engine may be secured direct from the manufacturer by mentioning this magazine.

Improvements Made in Line of Truck Mixers

A new series of 3½-cubic-yard and 4-cubic-yard Trukmixers has been added to the line of concrete mixing trucks by Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa. To provide greater strength and increased resistance to abrasion, manganese alloy steel is used for the mixing drums and the mixing blades. The blades are deeper and the opening between adjacent sections of blades permits faster and more thorough mixing.

The accuracy of water measurement has been improved by a dual system

A Blaw-Knox 3 to 3½-Yard Trukmixer

permitting automatic measurement from a full water tank into the mixer by adjustable overflow or, on the other hand, the exact amount of water required for the batch may be automatically measured into the tank. This patented overflow arrangement is designed to eliminate errors which may be caused by the splashing of water during transit, or inaccurate measurement while the truck is on a slope.

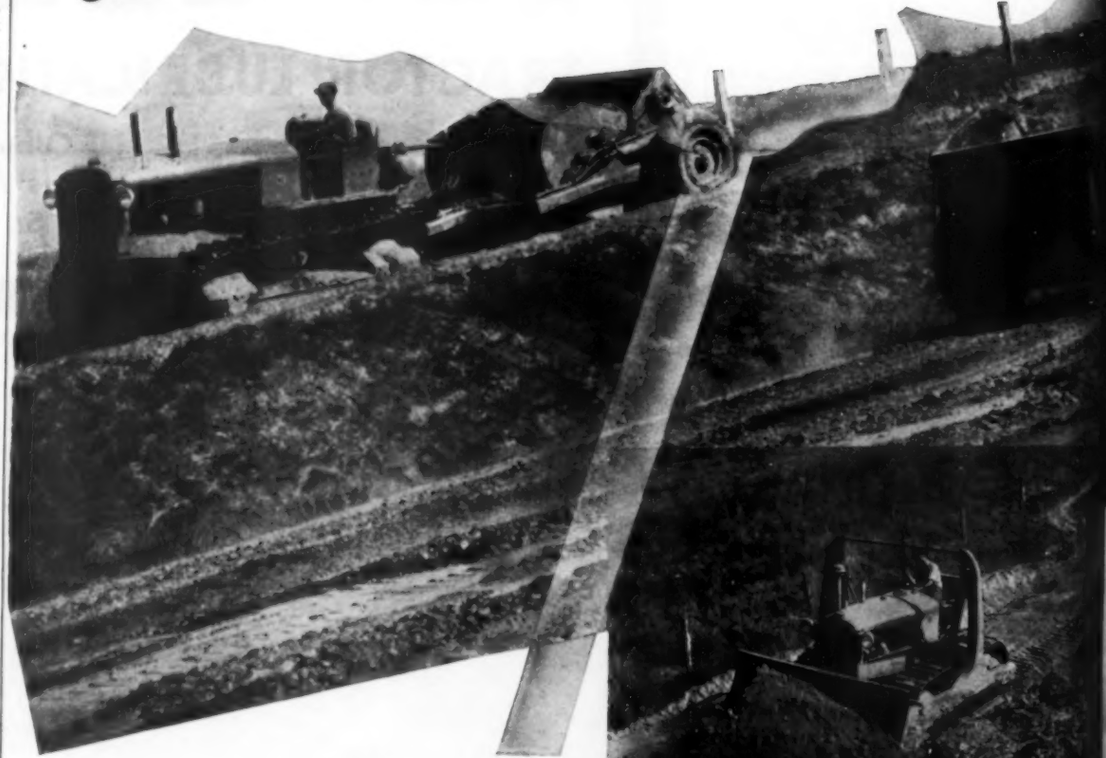
Charging and discharge doors are of machined steel and have machined cast-steel door seats, which are replaceable. The interior of the mixing drum contains no projections which might cause dry concrete to build up. All bearings and rollers for the support of the Trukmixer drum are oversize and sealed against concrete and dust.

Additional operating safety is contributed in various ways. The gasoline tank for the auxiliary engine is now located on the catwalk rather than over the engine itself, and the controls for the auxiliary engine are so located on the side of the truck that it is not necessary for the operator to lean over the transmission machinery to reach these controls.

Marmon-Herrington Moves

Without interruption of operations, the Marmon-Herrington Co., Inc., Indianapolis, Ind., manufacturer of all-wheel-drive motor vehicles, last month moved to its new and larger plant at West Washington and Harding Streets, Indianapolis. In addition to improved manufacturing facilities at the new location, the company now has on the premises ample proving grounds for Marmon-Herrington engineering developments. Sixteen acres are now being converted into a proving ground where units may be thoroughly tested.

HARRISON BEATS WINTER BY SHIFTING HIS JOB *into High* WITH ..



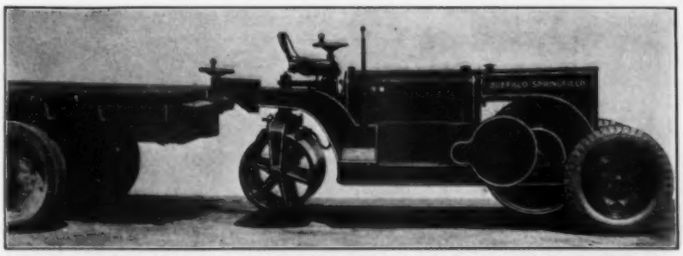
LOWER COST PER YARD WITH *Faster Power*

Fuel savings begin with the cost per gallon. A-C Controlled Ignition Oil tractors develop a full, even flow of power on any regular Diesel fuel or furnace oil. **No extra-cost, premium fuels or special engine lubricating oils are required. As a result A-C users normally save from a cent to 3 cents per gallon on fuel and from a fourth to a third on lubrication costs.** That fuel does more work, too, because the ***Faster Power*** of A-C tractors makes more trips per shift and moves more yardage per horsepower. Compare the performance and cost of ***Faster Power*** with slower-moving conventional tractors. See for yourself how it lowers unit costs.

Model K and Baker bulldozer trimming up along the side of a Model L and 7-yd. Continental backing to end dump around cu

High Compression And Trailer Rollers

The Buffalo-Springfield Roller Co., Springfield, Ohio, has announced an addition to its line of twelve models of road rollers. This addition is a large tandem roller weighing 16 tons unballasted, and 22 tons when the rolls and ballast tanks are filled with water. This 16-ton tandem delivers a maximum linear-inch compression of approximately .530 pounds, a compression which heretofore could be obtained only by a very heavy 3-wheel roller with narrow rolls. Buffalo-Springfield feels that this new roller will meet a definite need in certain sections of this country where very high compression is specified on asphalt finishing work.



The New Buffalo-Springfield 3 to 3½-Ton Tandem Roller with Towing Attachment

Another improvement in the Buffalo-Springfield line is a towing attachment which can be applied to the 3-3½-ton tandem for rapid transportation. The attachment consists of an adjustable tongue and two pneumatic-tired wheels which can be put on or taken off in only a few minutes by one man. The 3-ton model has been a popular one for some time for driveway and patch rolling, and its value is further enhanced by this simple and sturdy towing attachment.

Harrison speeded his job by working through cuts to fills at either end in some places and at others by cutting both ways to a fill in the center

Faster Power

When Harrison Engineering and Construction Corp., began the job August 30 of realigning and paving 7.9 miles of State Route 64 near Maquoketa, Iowa, *fast work* was necessary. The project called for 171,000 cu. yds. of excavation. It was planned to have half of that and 3 miles of paving completed before the winter shutdown. To meet this schedule Harrison put three Allis-Chalmers tractors—***Faster Power***—on the job. Much of the excavating was in the black top and compacted gravel of the old road, but A-C's reserve lugging power quickly put full loads in the Continental scrapers—scarifying was unnecessary. ***Faster Power*** in the higher working speeds shortened the time between cut and fill, enabled Harrison's rigs to make many extra trips each shift. A-C's easy maneuverability and the end dumping of the scrapers made possible important savings in backfilling around culverts and in other tight spots. By Thanksgiving, when winter forced a shutdown, Harrison had graded 5½ miles and was well ahead of the planned schedule ... thanks to A-C's ***Faster Power.***

Many other contractors, like Harrison, are finding that ***Faster Power*** saves them time and increases output from start to finish. Their A-C tractors start instantly and go right to work—no fussing with or waiting on auxiliary motors. Their equipment moves faster because A-C tractors have more and higher speeds—that means greater flexibility and the right speed for every task. They move bigger yardages per horse power because A-C design eliminates speed-robbing dead weight. They gain extra trips hourly because A-C tractors move faster in the higher speeds at which 90% of all construction is done. Shift your job into high with ***Faster Power.***

ASK YOUR NEAREST A-C DEALER TO SHOW YOU WHAT *Faster Power* CAN DO FOR YOU.

ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE, U. S. A.

Pump Builds Levee Without Side Dikes

(*Continued from page 2*)

dropping to ground level on 1 on 5 slopes.

The Hydraulic Dredge Grand Lake

On this particular piece of work, Item C, Dauterive-Fish Island protective levee the Grand Lake averaged 103,600 cubic yards of "pay dirt" a month where the material was 45 per cent sand, 35 per cent clay, and 20 per cent silt. There were 1,290,000 cubic yards in the subcontract of the Sternberg Dredging Co. of St. Louis, Mo. The unit price bid by the general contractor, the McWilliams Dredging Co. of New Orleans, was 35.90 cents per cubic yard or $463,110.00.

The Grand Lake is a wooden barge 100 feet long, 35 feet wide, and 6 feet deep with 24-inch Oregon fir spuds 70 feet long and 62-foot steel spuds. The ladder is of steel construction 65 feet long and connected to the dredge by a trunnion. The 6-blade cutter is driven by a General Electric 150-hp motor, giving it a normal rotation of 14 to 22 rpm.

The main engine is a General Electric 750-hp 60-cycle motor operating at 420 rpm. The auxiliary engine is a 440-kw Continental acting as a relief for the main engine. The smaller engines are: one 50-hp General Electric 150-rpm unit for the winding gear and one 150-hp General Electric 1,750-rpm unit for the cutter. These small engines are served from the main engine through the transformer.

The dredge pump is a Bucyrus-Erie with a 24-inch suction and 22-inch discharge, and a 3-vane 58-inch impeller. Auxiliary plant carried on the barge includes one 1,500-watt Kohler light plant, one 110-volt Kohler light plant, one 110-volt Wagoner ice plant, and a White truck motor used to raise the spuds and ladder when the unit is not being supplied with electric current either from the contractor's own power barge or from a nearby utility high-tension line.

The attendant plant includes a quarterboat housing 50 men, a 150-hp diesel tug, Swanee, a gasoline launch, a transformer barge, a pipe barge and a derrick barge. The pipe-line equipment included twenty sections of 22-inch pontoon line 50 feet long with Stern connection, a 3-ball joint nipple. The shore pipe made up in 16 and 20-foot joints is also 22 inches diameter and has flanged joints. The contractor had 10,000 feet of land line on this job and used every bit of it in his maximum pumping.

Personnel

This work is being carried on under the direction of the Second New Orleans District, U. S. Engineer Department, Lieut. Col. William F. Tomkins, District Engineer, and Capt. Chester K. Harding, Area Engineer.

Anti-Vibration Methods Described in New Booklet

Korfund anti-vibration methods and products, including Korfund Vibro-Dampers which utilize steel springs and Seismo-Dampers using organic materials such as natural cork, for isolating heavy engines in equipment and thereby eliminating vibration, are described in a new booklet recently issued by the Korfund Co., Inc., 45-18 32nd Place, Long Island City, New York.

While this booklet "Smoother Sailing with Korfund" describes particularly the application of Korfund anti-vibration methods and products to marine installations, the same principles are applicable to all installations of heavy engines. Copies of this booklet may be secured direct from the manufacturer.

Big Concrete Paver Turns Ark. Traveler

(*Continued from page 1*)

by the Big Rock Material Co. of Little Rock and the gravel came from the Malvern Sand & Gravel Co. of Malvern, Ark. A Northwest crane with a ½-yard Williams clamshell unloaded the sand to a Heltzel single batcher. A Moore Speedcrane with an Owen 1-yard clamshell unloaded the crushed stone and gravel to a Butler double batcher.

Bulk cement was supplied by the Arkansas Portland Cement Co. and a 4-car cement platform was built to handle the number of cars that might be needed between shifting. The cars were shifted along the spur track by a Caterpillar Sixty-Five tractor and steel cable. The cement crew consisted of seven men working in the two cars that were open at one time. One man assisted pushing the loaded Kone Karts from the Fairbanks scales where two men weighed the loaded carts that they had pushed out from the car. Two men in each car shoveled. A bridge was provided beneath which the Continental hydraulic scraper had excavated a runway for the batch trucks. There were two loading holes for the 2-batch trucks, all Ford V-8's and owned individually. Each load was covered with a "bed sheet" of tarpaulin after leaving the cement platform and before driving out to the paver.

The batches on the day this job was visited consisted of 1,421 pounds of sand, 1,283 pounds of gravel, 1,264 pounds of crushed stone and 611 pounds of bulk cement, or 6½ sacks. The gravel ranged from ¾-inch to No. 4 screen and the crushed stone from 1½-inch to No. 4 screen. The water cement ratio was 5½ gallons to the sack of cement, with 0.35 gallon allowed for evaporation toward the latter part of the work, owing to the hot dry weather encountered and the large amount of water lost from effective work between the paver and the final finished slab before it was covered with the curing mats.

On the unloading there were one man in each of the cars being worked by the cranes, the two crane operators and the two weigh men. A night watchman carried the protective burden at night. The contractor maintained a gas station on the job and sold gas to the batch trucks at fleet rates.

C. & E. M. Photo

Seven Men Made Up the Crew at the Bulk Cement Dock

The Paver Rolled 'Em Out

The job ran practically north and south with Conway on the north end and Palarm on the south end. The first batching set-up was about 5 miles south of Conway and the second at Mayflower 3.86 miles south of the first location. Paving was started at Conway and continued south to Gold Creek, a distance of 5 miles.

With the paver running between the forms, the skip man was a busy individual as he had to punch the batch cards of the truck drivers. The contractor paid the truck owners on the basis of the length of haul in quarter miles from the batching plant to paver and this varied frequently because of the speed of the machine in laying down the slab. The Ransome Dual-Drum paver was operated on a speed of 18 rpm for the drums with the mix remaining 33 seconds in the first drum and 32 seconds in the second, producing a concrete of 2 to 3-inch slump. A pair of

(*Continued on next page*)

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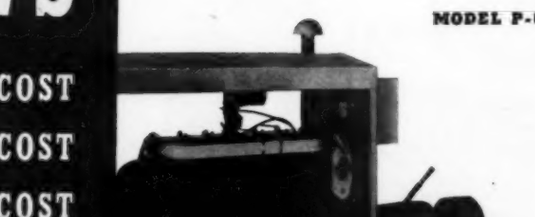
MODEL P-61



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● The lighter weight of air cooled power units makes them easier to move about and, when used in commercial vehicles, allows for greater pay loads. The weight of radiator, plumbing system and water is eliminated without sacrifice of ruggedness. Aluminum alloy cylinder heads also effect considerable savings in weight.

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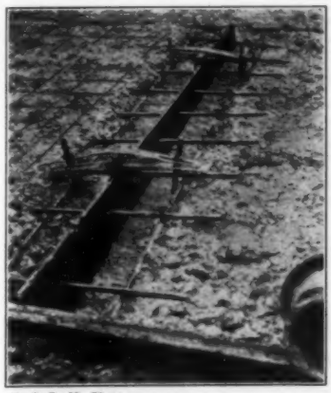

C. & E. M. Photo

An Expansion Joint, Showing the ¾-Inch x 10-Foot Steel Plate for the Poured Joints, the Reinforcing and the Clean Grade Left When the Wooden Panels Were Removed

Fast Paving in Ark. By Dual Drum Paver

(Continued from preceding page)

steel sheets was welded to the paver skip to make it easy for the trucks to back into the skip for dumping without losing any cement or aggregates. During the part of the work when there was little rain, one man was kept just at the paver sprinkling the grade to prevent absorption of water from the mix. This man also took care of the mixer hose. There were two 225-foot hose and one was always kept ahead connected to the next valve and stretched back ready to be connected in a moment without losing a batch. The paver pulled a Cleveland Trail-Grader and four men shoveled the excess earth from the subgrade. These same men put in the two marginal bars on each side. These ⅝-inch smooth bars in 26-foot lengths were oiled and lapped 2 feet at the ends. They were run through holes in the Trail-Grader and placed at the mid-depth of the concrete about 3 and 8 inches from the forms. One man ahead of the paver performed the all-important function of oiling the forms.

The steel in the slab is quite complicated until you get used to it. First there is the center strip which was cut out through its entire length along the center to permit a tongue of the concrete through it. The center strip was placed along the center of the slab, is 10 feet long and is held by five vertical pins per length. Deformed bars 4 feet long and ½-inch diameter were run through the center strip at 5-foot intervals after the concrete had been struck off for the reinforcing fabric. These mats measuring 9½ feet x 17 feet were handed in by two men who assisted with the paver hose and were placed by the puddlers.

The pavement was poured with expansion joints ¾-inch wide every 50 feet. The placing of these was handled in a novel manner. At the location of the joint a pair of wood panels was laid down on the subgrade. These were 10 feet long and 10 inches wide. When the concrete lapped over them they were removed, leaving a space clear for the setting of the expansion joint. This was made up of a ¾-inch steel plate with notches for the dowels which were held in place by a pair of clips for each 10-foot joint setter. The dowels, nine to the 10-foot section, are ¾-inch diameter and 2 feet long with metal compressible caps on one end. The dowels were oiled. Two transverse rods ⅝-inch diameter and 9 feet 6 inches long were wired to the dowels 8 inches from the joint to hold the dowels in line. The steel plate carrying the dowels and transverse bars was staked on both sides with three pairs of pins which remained in the concrete until after both finishing machines had completed their work.

Working in the concrete immediately behind the paver were four puddlers, two of whom spaded against the forms to eliminate honeycomb at the edges. All of the center steel was set by one man. As soon as the concrete placed was of sufficient depth, a heavy steel strike-off was pulled over the forms,

(Continued on page 37)

GALION Chooses Tension-Bilt STEEL WHEELS

for NEW No. 120 Leaning Wheel Grader

A brilliant performer is this new Galion No. 120 Leaning Wheel Grader. Improved hydraulic control gives the operator of this flexible, efficient and rugged Galion triumph complete mastery of any type of road job.

From wheel to blade this sturdy grader is built to absorb the punishing shocks of the toughest grading conditions.

Tension-Bilt Steel Wheels were chosen because they have proven their ability to absorb and dissipate service shocks at the instant of impact. Where permanent wheel strength is important follow the lead of the Galion engineers—use Tension-Bilt steel wheels.

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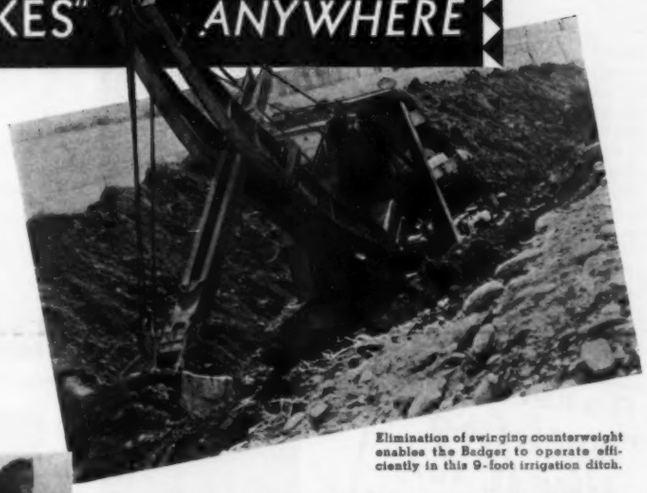
THIS ¾-SWING BADGER HAS "WHAT IT TAKES" ANYWHERE

E. W. Delano, President, Gaynor Delano Scott Corporation, Allentown, Pennsylvania, says:

"We did not fully appreciate the advantages of the Badger over the full revolving type shovel until we put it to work. For six months our Badger has been kept busy almost constantly on work which cold not have been done with a full revolving shovel. We are thoroughly satisfied with its performance."



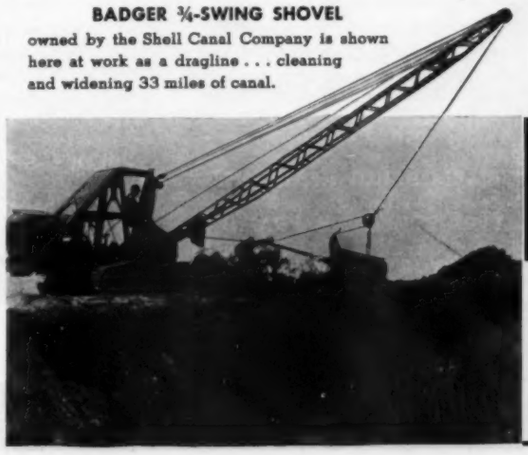
Elimination of swinging counterweight enables the Badger to operate efficiently in this 9-foot irrigation ditch.

UNUSUAL DUMPING HEIGHT

. . . without sacrifice of operating stability . . . is made possible by distinctive upward curve of boom and high location of the shipper shaft.

BADGER ¾-SWING SHOVEL

owned by the Shell Canal Company is shown here at work as a dragline . . . cleaning and widening 33 miles of canal.



▶ Faster start—swing—stop enable the Badger to outperform a full revolving shovel of the same rated capacity . . . at lower operating costs. Because only the boom, dipper, and dipper stick move with each swing, the Badger can maintain high operating speed without excessive fuel bills and operating expense.

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The Badger stands up in hard digging and has a 10,000 pound single line pull on a three part line. Low center of gravity and correct weight distribution permit this extra digging power. Other Badger Features: Fully roller bearing equipped—convertible to crane, clamshell, dragline, pile driver, etc.—portable at truck speeds on trailer or its own convertible mounts—Diesel or Gasoline power.

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Please send engineering details and performance records on ¾-Swing Badger.

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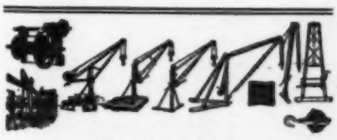

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Picks and Shovels

(*Continued from page* 16)

got out and offered to pull out the car. The owner, confused and frightened by the storm, said "No, no, no. I don't want to go that way. I'm headed west." And the driver's first job was to explain to the owner of the car why he had to pull the car out backwards.

The visibility was so low that night that a bus with passengers had to stop a few miles from town and wait for daylight before it was able to continue. As daylight approached, they discovered a farmhouse less than 150 feet from the stranded bus and in which they could have stayed safely during the storm. Two of the snow removal crew on a snow plow were out of communication with headquarters until 10 o'clock the following day and two men were picked up the morning after the storm, suffering with badly frozen hands and faces. They have STORMS out in those wide open spaces!

During last winter, these storms were so continuous that the snow was drifted on the highways to a depth of 3 to 15 feet. One drift extended for 10 miles. East of Browning, the road was drifted and packed so hard that it took 20 hours of steady running with a rotary plow to go 2 miles. Drifts were encountered by V-type plows which took 8 hours to plow 1,000 feet.

All possible credit should be given to the men operating the equipment in storms like these. Their steadfast nerve and patience resulted in open highways the major portion of the winter. And it might be added that Montana can point with pride to the fact that not a single fatality has occurred in the history of the state highway department, due to the vigilance and constant effort and loyalty of all the employees.

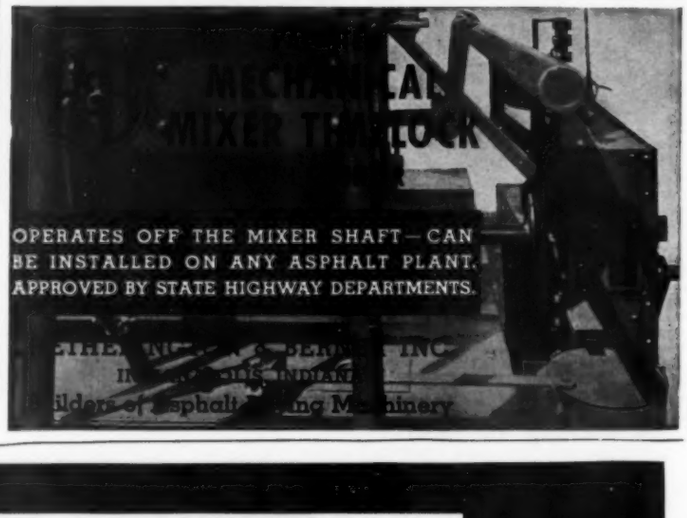
Mr. Price, who told us this story of Montana's struggles with the snowdrifts last winter, wrote on January 10 of this year, "It is fortunate that such winters are not very frequent except in the mountains. So far this year the boys are still playing golf and wondering when in hell winter will begin."

A New Atomizer Head For Paint Spray Guns

An entirely new principle is incorporated in the new atomizer head or air cap recently developed by the Alexander Milburn Co., 1493 W. Baltimore St., Baltimore, Md., for its Type MM and Multi-Width spray guns. These new heads discharge jets of "hollow air" instead of solid jets of air heretofore used in paint spray guns.

Due to the spreading of the air in a conical shape from these new jets, a large soft area of air flattens the enamel, paint or lacquer, atomizing it to the outermost edges of the spray, according to the manufacturer, and widths of 18 inches and upward are obtained.

Literature on these improved paint spray guns may be secured by interested contractors, state and county highway maintenance departments direct from the manufacturer by mentioning this magazine.



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The full-automatic feature permits maximum speed where conditions warrant, since the tractor does the work! In other situations, where the semi-automatic control is desired, the operator aided by a rope, always maintains perfect regulation.

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The Groundhog's large capacity and easy operation, plus low investment, economical and trouble-free service, insure more yards moved, at less cost per yard. The "Groundhog" will enable you to make money in earth-moving, even at "low" bids! Write TODAY for illustrated folder containing all the facts.

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CHEVROLET

"THE THRIFT-CARRIERS FOR THE NATION"

Arch Cape Tunnel On Oregon Coast

1,200-Foot Bore Near Famous Smugglers Cove, Oregon, Part of New Coast Highway

By HENRY W. YOUNG

(*Photos on page 44*)

✦ South of Cannon Beach on the Oregon Coast, and north of Nehalem, is an extremely rugged section that had never been traversed except by the roughest kind of foot trails. Included in this stretch is Cape Falcon and the hidden Smugglers Cove on which is Short Sand Beach. It had been necessary to divert the Oregon Coast Highway far inland to get around this section, cutting out one of the most beautiful scenic regions in all Oregon. Now, by means of the Arch Cape Tunnel, three sections immediately south of it, one of which has been completed, and the Short Sand Beach Creek and Necarney Creek bridges, completed last year, this piece of coast line will be conquered and soon the traveler will pursue his way along or closely paralleling the entire coast line of the state.

Arch Cape Tunnel, while not extremely long, something over 1,200 feet, was not an easy one to negotiate. The location is rather remote and the approaches difficult. It was a one-ended operation, since there was no access from the south end, although, because of the grade sloping to the north, that probably would have been the most economical in any event.

The project involved a fill and open cut at the north end, a 166-foot long composite pile trestle bridge with concrete deck and a tunnel through approximately 700 feet of diced basalt and the remainder through shale and debris. The tunnel is a simple arch with a 16.5-foot radius, an average profile grade of 5.3 feet below the radius point, a total height of 21 feet 8 inches and a width of 33 feet at the radius point, with an additional batter of 0.3 foot to the profile grade. There is a ledge on each side 1.3 feet high and 3.3 feet wide, for a pathway to be constructed later. The tunnel is all on a down grade of 5.007 per cent from the south end, flattening to a 700-foot radius vertical curve at the north end, where the fill was made with material from the tunnel excavation. The tunnel is a straight tangent, with a short spiral at the extreme south end to meet a 9-degree curve. The contract for the work was awarded to Orino, Birkemeier & Saramel on their bid of $166,904. Work began on February 25, 1936, the actual underground work was started the following June, and the project was completed February 1, 1938.

Exploratory tunnels 6 x 6 feet had been driven by state forces, entering rock for about 10 feet. Striking into the mountain side at the north end, the contractor first encountered 175 feet of earth, shale-like material and debris. This, of course, made necessary an enlargement of the bore to permit timbering, which was done by 12 x 12-inch treated fir sets or rings. The rings were on 2 to 4-foot centers, depending on the material, and were set on timber sills to be covered later with concrete under this contract. Four-inch lagging was used over the top, with 3-inch behind posts. Cedar blocking and cedar cord wood packing was used to fill in the overbreak.

Until well underground, or about 60 feet, drifts were driven for the sills, the core being taken out after the timbering had been put in over the top. After that, it was possible to open the whole face far enough to place sills and timber arches.

Blasting and Mucking

It was found necessary to blast in this material from the beginning, in order to load by shovel to trucks, which was the method of mucking out through the whole length. Gardner-Denver hammer drills were used, four at a time, starting out with an Ingersoll-Rand Model 315 compressor of 310-cubic feet capacity. When rock was reached, it was necessary to treble the size of the compressor plant and to go to water Leyners.

On the full size face in the softer material, four to six holes were drilled abreast, with a bottom row of lifters, to a total of 20 to 30 holes, depending on the material. The depth was 12 feet and the drilling would go fast until the drills clogged, after that necessitating frequent pulling and blowing. The material was highly abrasive, taking the gage off the bits rapidly.

Very light loading was used, 17 or 18 sticks per hole ordinarily. The explosive was Atlas 40 to 60 per cent for the most part in this material, with a delay from 1 to 10. Atlas delay electric blasting caps, No. 6, were employed, fired from the electric service wires.

When the material was down, a Mar-

(*Continued on page 31*)

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HOBART BROS., Box CE-28, TROY, OHIO

WITH digging, swinging and dumping synchronized to a smooth "speed-lined" cycle, the modern 29-B hits a new high in one-yard performance. Anti-friction bearings in a straight-line gear train and two-part hoist deliver maximum power to the dipper teeth. Long upper boom section and big boom-point sheaves give better digging angles: longer rope wear. A direct-action chain crowd packs a digging punch that means extra-yardage. Ample power for easy mobility is transmitted by the single-shaft propelling drive. Investigate this 1938 one-yard winner — write today for detailed, illustrated specifications.

• • •

Gasoline, Diesel or electric power. Shovel uses 1-yard welded, cast V-front, inserted-tooth, curved door dipper. With standard boom combination at 45°, maximum cutting radius 31'6"; clear dumping height 17'6"; working weight 68,000 lbs. Crane rating at 12' radius is 31,900 lbs. Draglines and clamshells usually use 1-yard buckets and booms 40' to 55'. • • • •

BUCYRUS ERIE BUCYRUS-ERIE CO., SOUTH MILWAUKEE, WIS., U. S. A.
Excavating, Drilling, and Material Handling Equipment

New Hug Truck Models Displayed at Road Show

Included in its exhibit at the Road Show in Cleveland last month were the two new models announced by the Hug Co., 716 Cypress St., Highland, Ill., the Lugger Model 16 equipped with the new automotive-type Caterpillar diesel engine and the new Model 87Q Roadbuilder with a 6-yard scoop-end body.

The new Caterpillar engine with which the Lugger Model 16 is equipped is the first of a new series designed and built by Caterpillar Tractor Co. It has a displacement of 468 cubic inches and operates at conventional truck-type engine speeds. It also has a conventional electric starting system. This Model 16 has a special cab-over-engine tractor chassis with a maximum trailer payload capacity of 20,000 pounds.

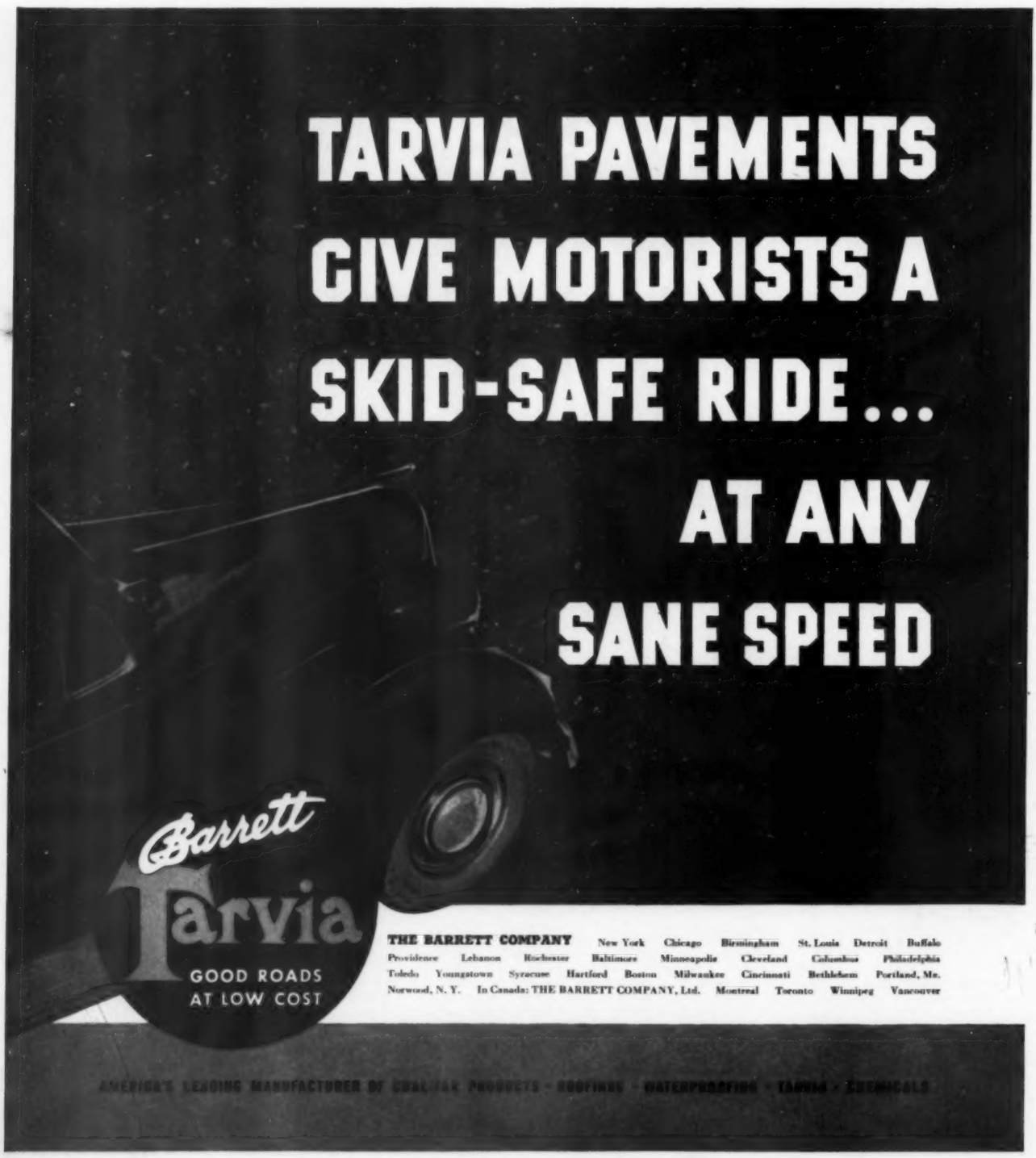
The Model 87Q Roadbuilder introduces a new armored front-end design, eliminating the conventional radiator shell and hood. It is claimed that this new design incorporates practical protection for the engine, radiator core and head lights against damage from falling material from shovels and loading equipment. This truck is also equipped with the new automotive-type diesel engine.

A Big Little Excavator Developed by Marion

The new Marion ¾-yard excavator has been designed to meet contractors' requirements for power, speed and performance. In designing and building this new machine, the Marion Steam Shovel Co., Marion, Ohio, has drawn heavily on its experience in building its larger, more powerful shovels. The ¾-yard excavator is built to work in close clearances and because of its mobility also serves well for crane service.

It has self-cleaning non-binding crawlers; a boom of tubular construction for maximum strength; a full-capacity ¾-yard manganese steel front dipper; full welded construction throughout; a simple arrangement of the controls; and ease of convertibility. These and other features will be described in full to interested readers of CONTRACTORS AND ENGINEERS MONTHLY writing direct to Marion.

"TRACTIONIZED"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GIVE MOTORISTS A
SKID-SAFE RIDE...
AT ANY
SANE SPEED
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GOOD ROADS
AT LOW COST
THE BARRETT COMPANY New York Chicago Birmingham St. Louis Detroit Buffalo
Providence Lebanon Rochester Baltimore Minneapolis Cleveland Columbus Philadelphia
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AMERICA'S LEADING MANUFACTURER OF COAL TAR PRODUCTS - ROOFINGS - WATERPROOFING - TARVIA - CHEMICALS

C. & E. M. Photo
Surface of Road 10 Months After Laying

Road Not Injured By Ice and Water

(*Continued from page* 14)

well and was whipped to the shoulders. During the summer of 1937 the county forces went back where the road showed some bleeding and bladed the gravel back from the shoulders to the road surface. At the same time some of the high spots that had showed up on the road were knocked off with the blade with considerable success.

That Ice and High Water

On the south two-thirds of a mile of the job where the fourth shot of asphalt was made to assist in the final mixing in October, the road was subjected to flooding for most of the month of January, 1937, when the entire area was in the throes of flood conditions. Traffic used the road continuously for this distance with the water standing about one foot deep. The temperature dropped to below freezing for about a week and ice formed on the surface of the water. This was continually broken up by the traffic. The ice and water did not seem to cause any damage to the road surface, except in one short section where there was apparently a slip in an old fill, for a crack opened up in the subgrade and up through the road surface about an inch or two in width. This healed when the ground dried out and by August, 1937, the surface of the road had practically healed completely as a result of the summer traffic to the nearby lake.

The Roads of Lawrence County

Lawrence County has 400 square miles within its borders and 640 miles of county-maintained roads, including 3½ miles of black top. A contract was let August 26, 1937, for 3 more miles of road mix.

The contract for the work described on State Aid Road No. 3, Section 19, was awarded to O. S. Calvert, of Lawrenceville, Ill., for $10,366.71 with the extras required during the work on the contract. The work was done under the direction of R. J. Benefiel, County Superintendent of Highways for Lawrence County, with Eugene S. Organ as Resident Engineer.

American Equipment At English Road Show

(*Photo on page* 44)

In the excitement over the A. R. B. A. Five-Star Road Show held in Cleveland last month, it is interesting to note that England, too, has her Road Show. A report from John Allen & Sons of Cowley, Oxford, sent to us by P. C. Ritchie of Waukesha Motor Co., describes the Allen exhibit at the Roads & Transport Exhibition held in London last fall. These shows are held every two years but the last one was the largest and most successful ever held.

Mr. Allen's letter said: "Saturday was the contractors' agents' and drivers' day and it is no exaggeration to say that at times we had between 40 and 50 people on our Stand. The eight members of our staff on the Stand that day were totally inadequate and were unable to deal with the crowds inspecting our products."

Much of the equipment in the Allen exhibit, shown on page 44, is American designed products built by that company in England and includes a Parsons ditch digger powered by a Waukesha-Hesselman engine, an Austin motor grader and a Michigan power shovel.

New Shank and Bit Punch

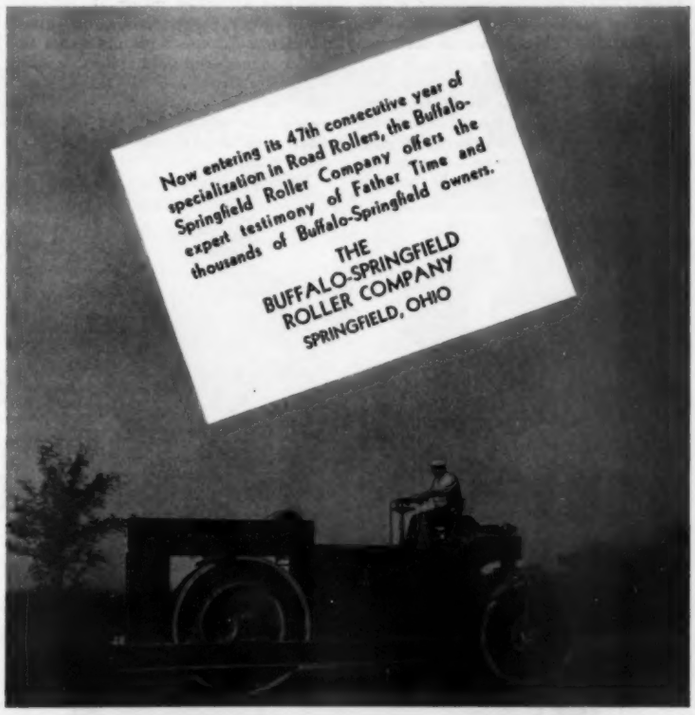
The latest development in rock-drill-sharpening equipment, a new shank and bit punch, has just been announced by the Ingersoll-Rand Co., 11 Broadway, New York City. This punch, mounted on a sturdy one-piece bracket, is adaptable to all recent I-R sharpeners. Its features include a more convenient location of the operating levers, a safety guard for the punch, and improved design, facilitating inspection and reducing breakage of punch pins.

Bulletin 2342, describing and illustrating this new Model 45SP shank and bit punch, may be secured by those interested direct from the manufacturer by mentioning this magazine.

Booklet on Wire Rope

A new "Riggers Handbook," containing valuable information on wire rope slings and fittings, directions for splicing and socketing wire rope and other details on the use of wire rope, has just been published by the Broderick & Bascom Rope Co., 4203 No. Union Blvd., St. Louis, Mo., manufacturer of Yellow Strand wire rope.

Copies of this Handbook may be secured by those interested direct from that company by mentioning this magazine.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SPRINGFIELD, OHIO

"BLIND DRIVING"

20% LESS FUEL

25% FEWER R.P.M.'S

52% MORE POWER

"Your Truck Needs More Gears"

"Blind driving" is operating a truck by guess, feel, or sound of engine speed. It's responsible for much engine trouble, needless maintenance expense and engine overhauls.

The usual 4 or 5 transmission speeds cause blind driving. With limited transmission speeds it's impossible to make fast road time with proper engine speed under all conditions of loads, roads and grades.

Now every engine has a certain range of speed where it operates at maximum efficiency and least wear and tear. And it has been definitely proven by test and experience in large fleets that fuel consumption can be reduced as much as 30% and overhauls as much as 50% simply by operating engines in that proper speed range.

Equip your truck with a Watson-Brown-Lipe and prevent Blind Driving. A Watson-Brown-Lipe provides the necessary gears to keep the engine operating in the proper speed range, regardless of the load, road or grade.

ASK FOR BULLETIN

DISTRIBUTORS LOCATED IN ALL PRINCIPAL CITIES

AUXILIARY *Transmissions* **WATSON-BROWN-LIPE** H.S. WATSON CO., SAN FRANCISCO & TOLEDO

New Offset Bracket For Road Guard Rail

A new offset bracket for cable highway guard, called the Tite-Rope offset bracket, has been announced by the Highway Steel Products Co., Chicago Heights, Ill. This device is an open spring which holds the cable 5 to 7 inches from the post and keeps it constantly under tension. When the guard rail is installed with these brackets the cable is drawn into the spring in such a manner that the spring takes up any slack in the cable caused by temperature changes.

These brackets are made of 3/16-inch spring steel and are heat treated to meet the specifications established by the U. S. Bureau of Public Roads. It is claimed that they are shock-absorbing, economical to install, highly visible at night and adaptable for use with old posts and cables to modernize old highway guards. They are furnished to accommodate three or four cables where multi-cable guards are desired or for one cable where individual or two-cable guards are constructed.

Descriptive literature on these new brackets may be secured direct from the manufacturer by mentioning this magazine.

Job Lighting Outfits

A number of western contractors have been using 200-hp 125-kw 514-rpm diesel-electric generators made by Atlas Imperial Diesel Engine Co., Oakland, Calif., for both light and power in the field. One contractor mounted one of the portable-type units on a trailer to permit moving the outfit from one job to another in the least possible time. Atlas furnishes the diesel-electric unit with the trailer and makes the necessary mounting if desired, but most contractors usually purchase their own trailers or mount the outfit on some of their present equipment.

This same manufacturer furnishes generating units between the capacities of 10-kw and 175-kw. The 18, 40, 80, 120, 200 and 275-hp diesel units are direct connected to generators of 10, 25, 50, 75, 125 and 175-kw respectively.

Leaflets describing these various units may be secured direct from Atlas Imperial Diesel Engine Co.

Here's how St. Paul

PROTECTS ITS INVESTMENT IN PAVEMENTS

with

STANOLIND CUT-BACK ASPHALT

● St. Paul, like many other cities in the middle west, has found that it is cheaper to protect its pavements by surface treating than it is to pay the high repair bills and repaving costs that inevitably follow where pavement surfaces are neglected.

Surface treatment with Stanolind Cut-Back Asphalt, as described here, is a simple, inexpensive method of restoring the wearing surface of asphalt or asphaltic concrete streets that has been worn by traffic. It provides a smooth riding, non-skid surface. It protects your original investment in the street, assuring the long life that properly maintained asphalt paving will give.

Let a Standard Asphalt representative describe this method fully to you. He can give you specifications and figures on this and all types of asphalt paving. Call him at your local Standard Oil (Indiana) office or write: 910 South Michigan Avenue, Chicago, Ill.

The four steps illustrated here describe the surface treatment of sheet asphalt streets in St. Paul, Minnesota.

1. Applying prime coat.
2. Spreading rock for wearing course.
3. Mixing on the street.
4. Rolling.
5. The finished street. In this instance 65 pounds of aggregate and ¾-gallon of Stanolind Cut-Back Asphalt per square yard were used in two applications.

Copr. 1938, Standard Oil Co.

Asphalt for every purpose STANDARD OIL COMPANY (INDIANA)

1,200-Foot Tunnel On Ore. Coast Route

(*Continued from page 27*)

ion 1-yard shovel with boom shortened 20 inches loaded trucks at the face. The material was used first on the fill between the portal and bridge, and later immediately beyond the bridge where there was need for it. When into the rock, the only material change was to go to the water Leyners mounted on a Jumbo, the latter not having been necessary in the early stages.

While the rock itself did not present unusual difficulties, a considerable amount of water was encountered, and although it could be carried off by natural drainage it was attended with the usual amount of delays and vexatious conditions. When out of the rock and about 100 feet from the south portal it was possible to drift through, leaving the core intact.

The present south portal looks out on the side of the mountain, which falls off steeply to the ocean several hundred feet below. It had been the intention to continue with an open cut along the face. However, drifting into the mountain side in several places, it was found necessary to go in approximately 50 feet before reaching rock. After inspection and consideration of this condition, State Highway Engineer Baldock concluded that it would be unwise to make an open cut here due to the danger of slides and determined to continue the tunnel on around the shoulder of the promontory. So, after once holing out with the Arch Cape Tunnel, it will now be necessary to hole in again.

Personnel

The Arch Cape Tunnel was constructed for the Oregon State Highway Commission, R. H. Baldock, State Highway Engineer; F. D. Eason, Division Engineer; H. G. Smith, Construction Engineer; and A. V. Benedict, Resident Engineer. Otto Orchard was Tunnel Superintendent for the contractor, Orino, Birkemeier & Saramel, and R. M. Summit was subcontractor on the fill.

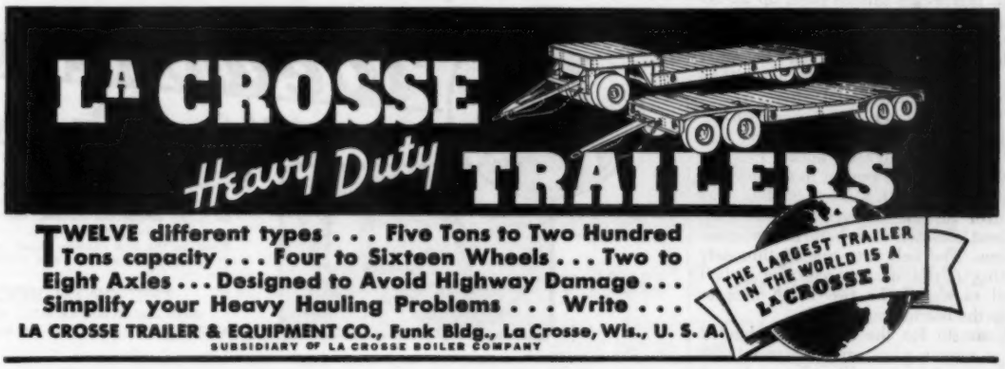
Smallest Electric Drill

Reduction of weight and size to half the former standards for ½-inch capacity drills, without sacrifice of strength or power, is the primary feature claimed for its new ½-inch electric drill by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. This new drill, known as the Thor U44, weighs only 9 pounds and is 12 inches in overall length. It is a heavy-duty tool, designed for continuous service. At the same time, its light weight and small size give it portability and carrying ease necessary for maintenance work.

Because of the design of the U44, great pressure can be applied, even with a bar or timber against the handle, without danger of throwing the armature out of alignment. The grip handle cap assembly bears directly on the field case, which has an arch for the upper bearing support so that there is no pressure exerted directly against the upper armature bearing support.

The U44 can be furnished with a 110 or 220 ac or dc universal motor which operates from any electric light socket. Free speed is 450 rpm and the full-load speed, 300 rpm. Standard equipment includes a ½-inch Jacobs chuck, spade handle, lever-type side switch handle that can be locked for continuous operation of the drill and 10 feet of three-conductor molded-rubber cable with ground wire.

Complete information on these new drills may be secured direct from the manufacturer by mentioning this magazine.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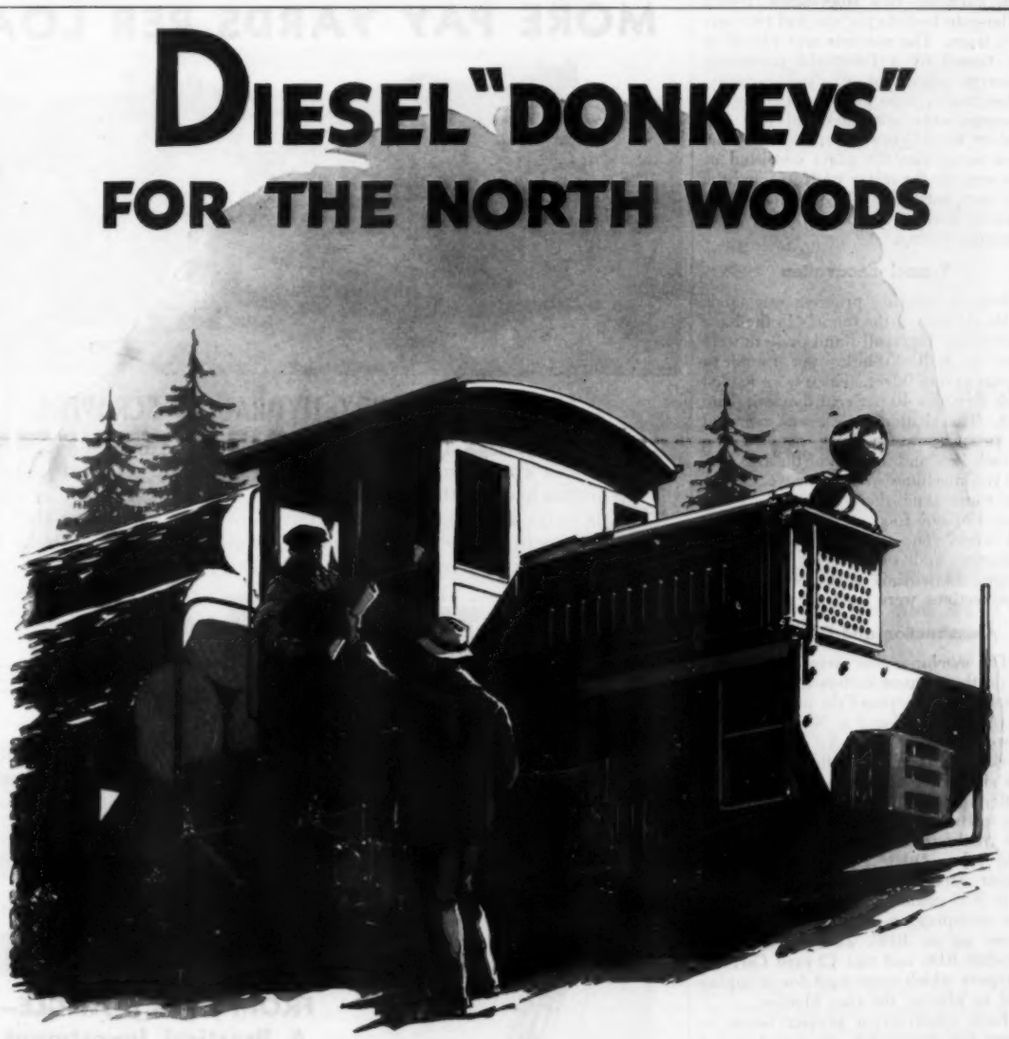
Heavy Duty TRAILERS
TWELVE different types . . . Five Tons to Two Hundred Tons capacity . . . Four to Sixteen Wheels . . . Two to Eight Axles . . . Designed to Avoid Highway Damage . . . Simplify your Heavy Hauling Problems . . . Write . . .
LA CROSSE TRAILER & EQUIPMENT CO., Funk Bldg., La Crosse, Wis., U. S. A.
SUBSIDIARY OF LA CROSSE BOILER COMPANY
THE LARGEST TRAILER IN THE WORLD IS A LA CROSSE !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FOR THE NORTH WOODS
Hercules Engines and Power Units—both Diesel and gasoline—meet the exacting demands of the lumbering industry. Designed and built for widely different applications in many fields, Hercules Power has long been used by leading manufacturers of industrial and agricultural machinery, as well as automotive, marine and oil field equipment. For more than 22 years Hercules, alert to the growing demands of industry, has continually broadened its line by introducing new models of advanced design—and today is the world's largest manufacturer specializing in the production of multi-cylinder, internal-combustion engines only.
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HERCULES MOTORS CORPORATION, Canton, Ohio
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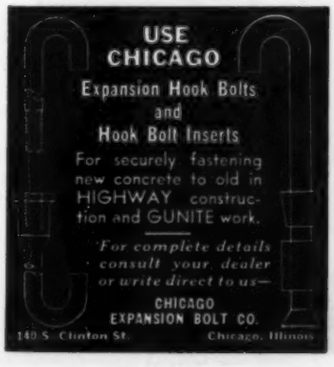
AMERICA'S FOREMOST ENGINE MANUFACTURER
Power Plants from 4 to 200 Horsepower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For securely fastening new concrete to old in HIGHWAY construction and GUNITE work.
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140 S. Clinton St. Chicago, Illinois

Large Water Supply From Rock-Fill Dam

(*Continued from page 19*)

inch belt which carried them up an 18-degree slope to a hopper above the mixers. It was equipped with a pneumatic gate for delivery to one or the other of the two 1-yard Smith non-tilting mixers which had electric drive.

A Jeffrey power shovel was used for unloading the bulk cement to the boot of an enclosed Jeffrey bucket elevator which carried the cement to the top of a 500-barrel Blaw-Knox cement bin. The control for the material belt and the cement elevator were both in the mixer house. The belt was run continuously during a run of concrete and a bell used to signal the two batch men to drop the batches on the belt.

Concrete for the tunnel was hauled by a narrow-gage railroad, using flat cars carrying two Blaw-Knox 1-yard roller-gate buckets per car and two cars to a train. The concrete was placed in the tunnel by a Prestweld pneumatic concrete placer of ¾-yard capacity. When trucks were used for hauling the concrete, only one bucketful was carried by the 2½-ton Internationals. The crew to operate the plant consisted of two men on the mixer platform and the two men batching. The maximum production was 30 yards per hour with 2-minute mixing.

Tunnel Excavation

Some interesting progress was made in the driving of the tunnels in the hard sandstone. Ingersoll-Rand drifters were used to drill 45 holes per round to depths of 8 to 9 feet. These were loaded with Hercules 40 per cent dynamite and shot. The shattered rock was removed by two Conway muckers, one working at each face and in spite of the fact that the two machines were never working at the same time there was a progress record of one foot per hour in the tunnel work. The tunnels are 20 feet in diameter and of inverted horseshoe shape. Blaw-Knox steel forms in 50-foot sections were used for the lining.

Construction and Destruction

The machines that were called upon to do the greatest variety of work were the No. 52 Bucyrus-Erie powered with an Atlas diesel and a Northwest 80D powered with a Murphy diesel. They worked as draglines in the stripping of the site of the dam, were used to build cofferdams, helped place concrete in the spillway, handling the buckets from the trucks to the forms, and 101 other odd jobs. Other equipment that did major service included two Bucyrus-Erie 50B steam shovels that worked on the stripping, a LaPlant-Choate bulldozer on an RD8, an Angledozer on another RD8 and two 12-yard Carryall scrapers which were used for stripping and in placing the clay blanket.

Each construction project seems to cause the destruction of some honored trees or local shrine and this job was no exception. A curious rock formation, a sort of table rock, has the reputation of housing honey bees who deposited many pounds of honey in the weathered clefts between the strata, according to the story of Bee Rock which will be flooded by the new lake.

Personnel

The Birmingham Industrial Water Supply Project is being carried on under the direction of the Engineering Commission, J. D. Webb, City Engineer, Chairman; O. G. Thurlow and A. Clinton Decker, with A. C. Polk as Executive Engineer. For the Engineering Commission, H. F. Peckworth is Resident Engineer on the Dam. For the Walsh Construction Co. of Davenport, Iowa, contractor for the dam at Inland, W. A. Durkin, Vice President of the company, was in charge as Project Manager with Clyde C. Turner as Tunnel Superintendent and J. D. Jacobs as Job Engineer.

"Wear INSURANCE" is sold with Every Owen Bucket

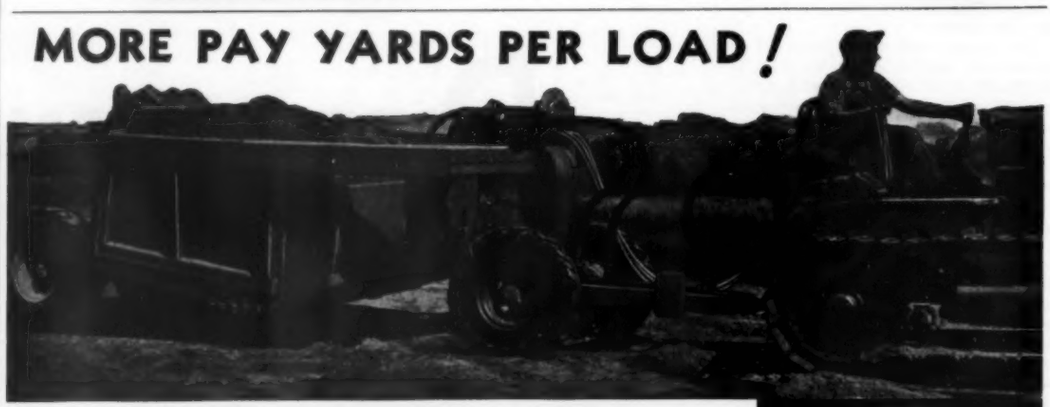
Efficient operation is of first importance in a bucket, but long service with freedom from repairs is equally essential.

In many important details, Owen design is conducive to this long, satisfactory operation.

Read, in the new catalog about protected sheaves, sealed shaft bearings, one-piece non-wobbling head, non-chafing cables, etc.

THE OWEN BUCKET CO.
6030 BREAKWATER AVE., CLEVELAND, OHIO
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Cal.

MORE PAY YARDS PER LOAD!



HEIL DIG-N-CARRY HYDRAULIC SCRAPERS

The Heil Co., manufacturers of world famous hydraulic dump units, announces a new and improved line of hydraulic scrapers that take top honors in all of the performance tests by which satisfactory operation is judged! By all means get complete facts concerning Heil Dig-N-Carry Scrapers before you buy—A new eight page bulletin (No. RM-300) is yours for the asking—Address:

THE HEIL CO.
GENERAL OFFICES: 3000 WEST MONTANA ST., MILWAUKEE
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BRANCHES AND DISTRIBUTORS EVERYWHERE

HEIL Quality PRODUCTS
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ROAD SCRAPERS SNOW PLOWS
BOTTLE WASHERS DEHYDRATORS
OIL BURNERS WATER SYSTEMS

WILLIAMS FORM CLAMPS

It costs 8c per cu. yd. of concrete for rod replacement in using Williams Clamps on a form design of 800 lbs. pressure per sq. ft.

Compare this with the cost of your present ties—and you will be added to our list of satisfied Customers.

Order today—24 hr. service—send plans for rod layout.

Williams Form Engineering Corp.
1344 Prospect Ave., S. E.
Grand Rapids Michigan

FROM EVERY ANGLE—
A Practical Investment
⅜ yd. MICHIGAN ½ yd.
SHOVEL-CRANE
Write for Bulletins C and C2

MICHIGAN POWER SHOVEL CO. BENTON HARBOR, MICHIGAN, U.S.A.

Renewable Mechanism For Fuel Injection Pumps

Renewable pumping units having a plunger diameter range from 4 to 9 mm for use in Timken fuel injection pumps were shown for the first time at the S. A. E. Convention in Detroit last month. These units are pre-metered at the factory, thus eliminating any pump-calibration or metering in the field and saving in installation time.

The Timken renewable pumping unit, made by the Timken Roller Bearing Co., Canton, Ohio, is a self-contained accurately metered precisely timed mechanism, comprising in a rigid simple unit body the barrel and plunger, delivery valve and the delivery valve spring. It is held tightly in the injection pump housing by means of two hexagonal nuts threaded on two studs on the pump housing, pressing against a flange on the upper end of the pumping unit body. The pumping unit is positive aligned axially in the housing and must be correctly aligned to be inserted. It slips easily into place and is tightened into the injection pump by means of the hexagonal nuts until the unit flange seats firmly on a gasket against the flat top of the housing.

Without removing the injection pump from the engine, the operator can easily and quickly replace a pumping unit which has been damaged or worn in service. Spare units may be kept on hand and replaced practically as easily as spark plugs for gasoline engines.

Cotton-Filled Mats For Concrete Curing

Road-curing mats with an absorbent material in the middle to hold water and permit efficient curing of concrete pavements have become standard in many states, and in others where their use is permitted contractors are using them to their advantage. Diamond Brand Canvas Products, 148-150 Greene St., New York City, makes a road-curing mat of a thick layer of cotton-jute batt between two heavy burlap covers. This rugged construction holds moisture at the top so that the concrete below cures more slowly and firmly, while the mat serves as insulation from both heat and exposure. These mats are stitched on a lock-stitch multiple-needle machine, with stitchings spaced 3½ inches apart, running the full length of the mat, and the edges are hemmed.

The Texas State Highway Department is reported to have used the same mat 75 times on road construction. The cost of these mats is only 3c per square foot, f. o. b. New York, and the most popular size is the 13 x 23-foot mat, giving a total of 299 square feet which is readily handled on the job.

New Rock Drill Catalog

An 80-page catalog which might be described as an encyclopedia on rock drills and associated equipment, with complete tabulations of operating and physical characteristics of drills and drilling tools as well as much useful information such as metric conversion tables, friction of air in pipes and hose, compressor capacities required to operate drills, etc., has just been issued by the Ingersoll-Rand Co., 11 Broadway, New York City.

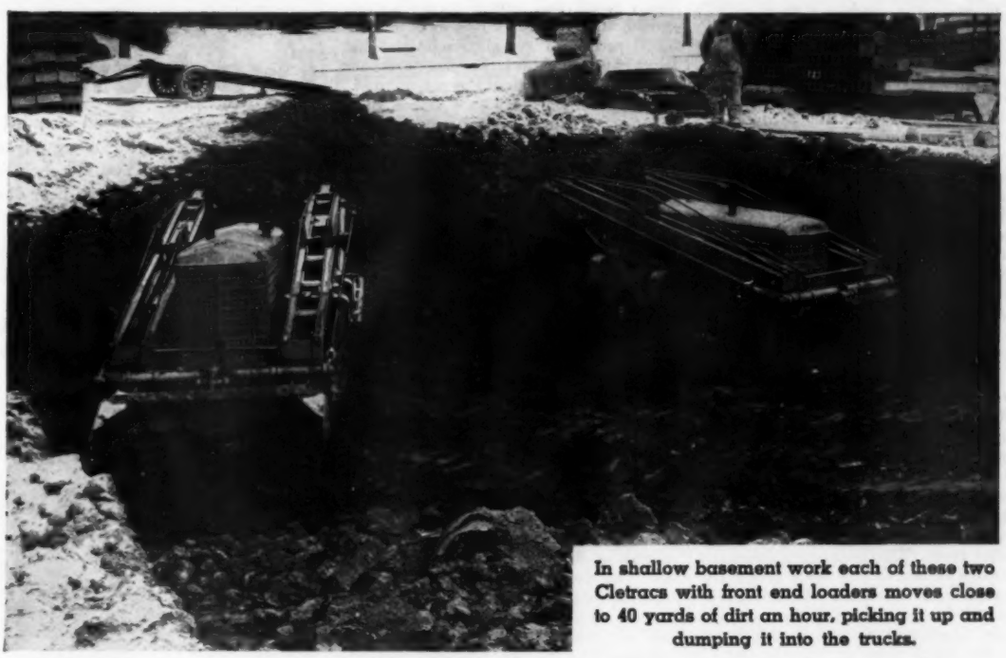
Copies of this Catalog No. 4201 may be secured by those interested direct from that company.

South Bend

BITUMINOUS MATERIAL DISTRIBUTOR

1908—Thirty Years' Experience—1938

MUNICIPAL SUPPLY COMPANY
SOUTH BEND, INDIANA



In shallow basement work each of these two Cletracs with front end loaders moves close to 40 yards of dirt an hour, picking it up and dumping it into the trucks.

Loose materials now move on the "Double Quick"

Excavating basements . . . handling sand, gravel, cinders, and other loose materials . . . cleaning up on the job . . . filling in around bridges and foundations . . . removing excess dirt from ditches . . . feeding conveyors . . . in all jobs where there are only comparatively small amount of materials to be handled . . . you can't beat a Cletrac with front end loader for speed and economy.

The Cletrac with front end loader has the capacity to pick up a full three-quarters yard of material. This decreases loading time. The outfit can be dumped at any height. This saves dumping time. With its controlled differential steering the tractor is more easily handled, pulls on both tracks at all times, handles larger loads on turns. This speeds up performance.

Furthermore, because of the design of the Cletrac, the entire load is carried on the side frame. There are no projections above or below the tractor. It can get in and out of tight places.

At slightly additional cost, the Cletrac and front end loader can be equipped with a scarifier that works from the rear of the tractor. This scarifier has a down pressure and will rip up brick pavements, black top, ice, dirt. The unit has double utility.

Check this outfit. Check the Cletrac . . . its sound construction . . . economy of operation . . . simplicity of maintenance. Check all the equipment that you can use with a Cletrac . . . bulldozers, scrapers, air compressors, welders, post hole augers, rock crushers, winches, booms . . . a tool for every requirement and a size tractor for every job—six sizes from 22 to 95 horsepower, either gasoline or Diesel.

THE CLEVELAND TRACTOR CO., CLEVELAND, OHIO

CLETRAC CRAWLER TRACTORS

The only tractors with controlled differential steering that keeps both tracks pulling at all times . . . on the turn as well as on the straightaway.

BUYING A PUMP?

INSIST ON:

- Faster, 100% Automatic Priming,
- Greater Efficiency in Any Size, at Any Lift,
- Thousands of Hours of Heavy Duty Service.
- Cut Your Costs with "Sure Prime" Pumps—2" to 10" Sizes, Capacities 7000 to 200,000 G. P. H. Send for New Catalog and Prices.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

JAEGER

Precast Slabs Set By Giant Cranes

(*Continued from page 21*)

slightly to break the bond between the two, as the $\frac{1}{4}$-inch slot between the slabs was formed by just the boards that had been placed to insure the exact conformation of the two when placed in final position and ready for the pouring of the joint with asphalt and the top with the lead topping over the sheet lead flaps. The slab was raised to the tracks and moved to a platform, built purposely beside the temporary pile trestle. Considerable difficulty was experienced in lifting the heavy load. However the slab was soon lifted to a position over the tracks between the two cranes, lowered to the tracks and the outrigger blocking removed. With the Canadian National crane in the lead the slab was picked up and cranes and slab moved forward 200 feet with the leading crane and its locomotive crossing the temporary structure and the slab landed on the temporary platform.

Great care was taken to see that the step between the two slabs was clear of every piece of gravel or other small obstruction so that when the second was placed there would be a perfectly uniform slot $\frac{1}{4}$-inch below the step between the two slabs. The moving of the second slab was done with the same care and precision that characterized the placing of the first and at 6:40 P.M., just 11 hours and 40 minutes after the operation started with the moving of the near slab to clear the far slab, the structure was completed, much to the joy of the contractor and the other parties involved.

The Temporary Structure

Returning to the construction of the temporary structure is perhaps a little prosaic after the description of the placing of the precast slabs but most engineering and construction is composed of the less thrilling but more important preparation for the final more spectacular tasks. The temporary structure consisted of twelve pile bents originally planned and consisting of two single bents of five piles each at the east end of the structure, then four double bents and two single bents at the west end.

The 35-foot untreated piles were driven by the pile driver of the railroad from the tracks and through the embankment. The center bents were driven first and then repeated for the other three double bents which were spaced 2 feet 6 inches apart. The single bents were driven 15 feet back from the end double bents at either end to take care of the slopes. Stringers consisting of three 24-inch I-beams with 6-inch flanges and weighing 100 pounds per foot bolted together with pipe spacers were used under each rail.

The caps on the bents consisted of 12 x 12's 20 feet long. On the double bents these were crossed with 12 x 12 members 6 feet long carrying three 12 x 12 timbers 20 feet long. The double bents were cross-braced with 24-foot 3 x 10's and five 3 x 10's 6 feet long.

The ties for the tracks on the temporary structure were spaced 4 inches apart and were carried on 24-inch 100-pound I-beams 26 feet long. The entire structure is skewed 45 degrees with the roadway and the bents had to be driven with the same skew. The ties are at right angles with the tracks while the caps of the bents are skewed and, of course, the I-beams are parallel with the rails.

Excavation, Grading and Drainage

On June 28, 1937, the contractor started grading the $\frac{1}{2}$-mile approach road with a Lorain 30 mounted on a White truck and rigged as a $\frac{3}{8}$-yard shovel. The roadway excavation totaled 6,500 yards and was all handled by the truck-mounted shovel. The final grading was by hand and then the entire roadway was compacted with a 10-ton Buffalo-Springfield steam roller. The contractor opened a gravel pit, using the pit-run gravel for the sub-base of the roadway which was 12 inches thick. The pit was only 300 feet from the structure excavation and was backfilled with the structure excavation so that the landscape was not disfigured with the disposal of the old railroad embankment material.

Excavation beneath the railroad tracks started at the center of the temporary structure with the Lorain shovel. It was moved in at an angle so that with the boom dropped it could work under the stringers and swing to load the trucks at the side. It managed to keep four trucks busy removing the excavated material, even with a short haul. Excavation started on the north side and was continued until the embankment broke through under the track. Then the shovel moved to the other side and cleaned up. The footing excavation was done with the same machine rigged as a dragline. With the excavation first from one side and then the other and in so many locations the Lorain literally hopped from one place to another throughout the day, a process made feasible by the truck mounting.

To relieve the pressure of the embankment material standing on a vertical face against the outside double bent on the west end of the job, the railroad asked to have the gravel excavated close to the detour being used by quite heavy traffic. In addition, another single bent was driven at the west end 15 feet back from the last single bent to protect the railroad embankment. The vertical face of the embankment later broke, showing slight cracks in the bituminous surface of the roadway used by traffic but there was very little earth movement and it did not affect the footing excavation.

To drain the surface and some ground water in the vicinity, an 8-inch vitrified clay pipe with open joints was laid in an open field to the south of the structure for a distance of about 20 feet, then it was continued for another 20 feet with cement joints to a 4-foot square drop inlet. This portion drains the open field. From the inlet a 12-inch concrete pipe runs down the east side of the road and crosses under the highway and is carried 200 feet to the edge of the river in an 18-inch concrete pipe. This latter pipe

(*Continued on next page*)

Send for Catalog No. 200

Two New Graders . . .

If you attended the recent Road Show you already know the many advantages of these two new Galion graders. You saw them in operation . . . you heard road men from far and near discussing the ease of operation and the flexibility of these two units.

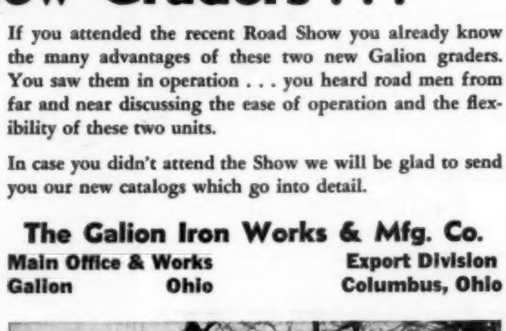
In case you didn't attend the Show we will be glad to send you our new catalogs which go into detail.

GALION ROAD MACHINERY

The Galion Iron Works & Mfg. Co.

Main Office & Works — **Galion Ohio**

Export Division — **Columbus, Ohio**



Send for Bulletin No. 221

NOW the "All Purpose Trailer!"

AGAIN the C. R. Jahn Company offers the very latest in practical trailer design. The "ALL PURPOSE TRAILER" is especially designed for owners of ⅜, ½, ⅝ yd. shovels, weighing up to 35,000 lbs.

The "ALL PURPOSE TRAILER" will carry your compressor, pumps, tools, small mixer and other equipment. It is furnished with stake pockets so that side panels can be installed for carrying bulk materials if desired.

The low loading platform has all the advantages found in the single purpose trailer. Look at the list of advanced engineering features offered in the Jahn "ALL PURPOSE TRAILER"—

- Single Purpose Trailer feature of removable front axle for convenient loading.
- Loading platform as low as 24".
- Strong wood platform fits flush with outer channel.
- Standard size tires available at all tire dealers.
- Brakes on rear wheels, loading ramps, lash rings, stake pockets, heavy draw bar safety chains, reflectors and flag sockets are all furnished as standard equipment.

If you are in the market for a light trailer, be sure to check into these outstanding exclusive features offered in the Jahn "ALL PURPOSE TRAILER."

For more detailed information about the Jahn "ALL PURPOSE TRAILER," write or wire—

C. R. JAHN COMPANY, Builders Bldg., Chicago, Ill.

"Come to Trailer Headquarters"

Crossing Spans of Big Precast Slabs

(*Continued from preceding page*)

also handles all the drainage from the structure. Four-inch cast-iron pipe drains are used, nine in one side and eight in the other, through the abutments to prevent an accumulation of water behind the abutments.

The loam that was originally stripped from the roadway area was stockpiled and later, with the Lorain rigged as a crane and using a ½-yard Williams clamshell bucket, was loaded to trucks for covering slopes and shoulders.

A total of 500 yards of riprap was placed along the roadway on the north side of the structure to protect it on the river bank. The roadway was oiled to consolidate the surface.

The Abutments

Prior to the asking for bids wash borings were made over the entire site of the structure to determine the foundation material. The results of these tests were checked completely by the pile-driving operations and excavations for the footings. The tests had shown a gravel fill about 17 feet deep where the railroad crossed the section, then a surface layer of gravel about 7 feet deep underlaid by a stratum of soft blue clay and sand varying from 6 to 15 feet thick, and below this layer a bed of coarse gray sand and gravel. The clay stratum runs out just west of the job and is thicker on the east end. The footings of the abutments were designed to run about one foot into the clay.

The footings of the abutments are 92 feet long, 13 feet 10 inches wide at the center section and 4 feet 9 inches wide at the ends of the wings. The original plans called for a total of 244 wood piles for the foundation but because of the location of the double bent and the desire of the engineers not to disturb the I-beams about thirty piles were eliminated from the final foundations. The footings are 3 feet thick and the pile butts were cut off so that they would extend one foot into the footing after it was poured.

The abutments are of gravity section with a vertical front face and a 3 in 12 batter on the back. Each abutment carries a projecting seat at the back running from the footing to the top of the abutment in the form of an inverted prism as a seat for the precast slab. This adds to the area of the abutments for carrying the slabs on the skew. The abutments are 16 feet 3 inches high, including the footings, and the wing walls are 31 feet long, extending on either side of the 26-foot base of the abutments. The wing walls slope down from the full height of the abutments to a height of 5 feet 5⅝ inches at the ends. They are without reinforcement except for the footings which have heavy reinforcing with old rails.

The foundation piles were all about 25 feet long and were pressure-creosoted before delivery. They all ran about the same in size with 8-inch tips and 12-inch butts.

Concreting

All of the concreting for the footings, abutments and wing walls as well as the prior operation of pouring the precast slabs was done with the same small

(*Continued on page 40*)

STERLING No. 6 CONCRETE CART

Sterling No. 6 Cart

6 cu. ft. capacity
42" dia. wheels
12 gauge tray
Malleable Trunnions
With Plain or Roller Bearings

A COMPLETE LINE OF STERLING WHEELBARROWS AND CONCRETE CARTS

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Ease the Barrow-loading around your Plant with properly constructed, time-saving units

—By LANSING

New F-4½
For easy loading and dumping. Never-slip axle, reinforced frame. Deep tray (Capacity 4½ cu. ft.) for mortar, concrete, etc. The 16" wheel with pneumatic tires makes easy wheeling.

A-18 Tubular Steel
Large pressed tray, 14-gauge steel—without seams. Capacity 275 lbs. coke or 430 lbs. coal. Sturdy, well braced. Top flanged, reinforced by rod—prevents breaking edges. Size 33" x 42". Extra bend in frame brings wheel under load.

These, or any of the big line of Lansing barrows are profitable investments. Get bulletin of full Line—with prices.

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NEW ALLOY STEELS MAKE THE P&H MODEL 255

The World's fastest 3/4 yard machine!

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New alloy steels — tougher, more resilient, yet far lighter than ordinary steels or cast metals are the reasons behind the 255's superiority in the ¾ yd. excavator field. Rolled plates, welded together into rigid units, make it a greatly simplified machine with greater strength and stamina. And its lightness means added "zip" on any dirt moving job. This design, developed over five years ago by P&H engineers, puts the 255, as it does all other P&H Pacemakers, *over five years ahead of the field!*

SEND FOR THIS NEW BOOK TODAY!

This new book gives complete details of the new design introduced to the ¾ yd. excavator field in the P&H Model 255. It tells what alloy steels mean to the excavator industry—what they mean to your profit sheets! It's yours for the asking—just send handy coupon below.

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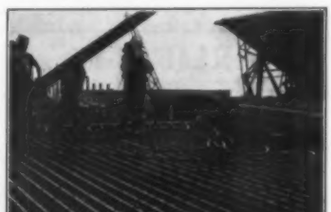
New Port Arthur Bridge Opening in March, 1938

The construction of the Port Arthur Bridge over the Neches River at Port Arthur, Texas, is rapidly being completed and will be opened to traffic in March, 1938. This $2,750,000 structure, which is 5.7 miles long, will serve the Hug-the-Coast Highway, U. S. 87, with a quick route into Port Arthur from Orange, Deweyville, and other cities and towns on Route 87 north of Port Arthur.

The main span of the bridge will be 1.5 miles long and will run well back into the marshlands on either side of the river, which is about 1,000 feet wide at this point. It will have a vertical clearance of 176 feet in the main span, giving ample clearance to the tops of masts of ocean-going vessels traveling light and riding high out of the water.

The steel fabrication of the Port Arthur Bridge requires 9,285 tons of structural steel and 1,906 tons of reinforcing steel, of which 700 tons are Jaltruss, a new concrete reinforcing section developed solely for reinforcing concrete slabs in the floors of bridges and other large structures in which the floors are subjected to the severe forces and stresses caused by heavy moving loads. It is a simple steel section of double Warren truss design rolled into shape in one continuous operation and is sold by Jones & Laughlin Steel Corp.



Pouring Concrete into the Floor of the Port Arthur Bridge Over the Neches River at Port Arthur, Texas

The construction of the bridge is being jointly financed by the PWA, the Texas Highway Department, and Jefferson County, Texas. Ash-Howard-Needles & Tammen, Consulting Engineers of New York and Kansas City, are in charge of the design of the Port Arthur Bridge and Taylor-Fichter Steel Construction Co. of New York is the contractor on its superstructure construction.

New 2-Cylinder Engine

One of the new gasoline engines on exhibit at the Road Show in Cleveland was the 2-cylinder air-cooled gasoline engine recently announced by the Stover Mfg. Co., Freeport, Ill. This new engine has a 2⅝-inch bore and 2¾-inch stroke, developing 5 hp at 1,800 rpm. It is a small, compact and readily portable unit, with a number of aluminum parts, such as drop-forged aluminum connecting rods, and is ball-bearing-equipped throughout.

Year in—Year out it's ETNYRE!

NO DRIPS: NO LEAKS: NO SKIPS: NO STREAKS:

1000 Gallon ETNYRE "BLACK-TOPPER" DISTRIBUTOR with Tachometer and Spray Bar in operating position. Twenty-four foot Spray Bar is FULL CIRCULATING from TIP to TIP.

● The combination of many new features make **ETNYRE again** outstanding in 1938. State and county highway officials demand clean cut work. **ETNYRE Distributors** make this possible with the **New Full Length Circulating Spray Bar** with **Valve Cut-Off** at **Nozzle** and **Vacu-Flo.** Also furnished with **Siphon Cut-off Spray Bar** and **Vacu-Flo** Cleaning System.

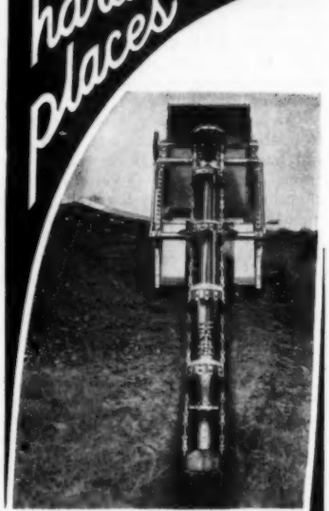
Weight has been substantially reduced . . . Operated with either simple lever control or air control from truck cab.

Let us furnish you with complete and detailed information about the New **ETNYRE "BLACK-TOPPER" Distributors:** Write **E. D. ETNYRE & COMPANY** at **Oregon, Illinois.**

1000 Gallon ETNYRE "BLACK-TOPPER" DISTRIBUTOR with Tachometer and Spray Bars in traveling position.

THE NEW ETNYRE Black Topper

For DITCHING in "hard-to-get-at places"



When your line for a ditch runs close to buildings, misses trees or poles by inches, or hugs the curb, it is time to get acquainted with the new Buckeye Model 120, and its shiftable boom.

Here is a Buckeye Ditcher, built to handle those difficult ditching jobs. It does the simpler jobs with equal efficiency, saving you time and money on any ditching job within its range of trench - 16" to 30" wide, and to 10' depths.

Write today for special bulletin.

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Dual Drum Paver Paves Fast in Ark.

(*Continued from page 25*)

cutting the concrete 2½ inches below the top of the forms for the placing of the reinforcing mats weighing 49 pounds to the 100 square feet and made of wires spaced 8 inches on centers. After the mats were laid the marginal bars were picked up and pushed down to mid-depth of the slab.

The paver set the pace for the entire outfit which worked two 6-hour shifts a day. The maximum length of 9-6-9-inch 20-foot slab laid was 1,856 feet in one 12-hour day while the average was about 1,120 feet, including both 9-6-9 and 9-7-9-inch slab, 20 feet wide.

The water supply was pumped from a small stream along the right-of-way by two Domestic triplex pumps working on each end of a 2½-inch pipe line with valves set every 400 feet and six sets of sprinkler hose connections for ¾-inch hose behind for curing.

Finishing Kept Pace

Right behind the puddlers were the two Lakewood finishing machines with their retinue of helpers so that it was possible to finish the pavement close behind the paver and avoid the delays that are so discouraging on a job where the concrete goes into the slab so rapidly. The first finisher had a front screed and tamper operating, although it was also equipped with a second screed. The first screed carried fully 15 inches of the concrete, making quite a load for the machine to push. It did, however, compact the material even ahead of the tamper, resulting in a dense concrete. The machine was operated across the expansion joints, making it most necessary to have the steel bulkhead set slightly low so that it would not be knocked forward by the screed.

Right behind the first finisher there were two puddlers who kept the grout worked up by the screed from running over the sides of the forms and also cut the concrete against the forms again. The second finishers carried, and used, two screeds and attached to the back of the machine was a roller for impressing the center stripe groove ¾ inch deep and 4 inches wide.

To permit accurate finishing of the center groove, 10-foot channels of the proper width and height were set in the depression by a man working from a 4-wheel bridge. Angle-iron gages let down by ropes and set from the forms made it possible to adjust the channels accurately to insure a straight line for the final finishing.

Behind the channels came the hand finishers who first used a longitudinal float from a 4-wheel bridge, working up to the channel from each side, lifting the float over the channel as they did also at the end so that the grout was not wasted over the edge of the forms. Two other men used 10-foot long-handle floats for correcting any irregularities in the surface and then dragged and checked the surface with 10-foot aluminum straight-edges. These men then used an 8-inch belt for their final work on finishing. Two joint finishers and two men finishing the center stripe wound up the finishing, except for the edging which was done by the hand finishers.

Curing was done with cotton mats ½ to ¾-inch thick and 10 x 20 feet in area. These were put on damp and sprinkled for 96 hours and then moved ahead. When the mats had been removed the expansion joints were poured and the center stripe material placed and hand tamped. A cold mix of asphalt, sand and chips was used for this purpose.

The shoulders were brought up to grade at the edge of the pavement by careful use of a 10-foot Austin-Western blade pulled by a Cletrac 80.

Behind the Scenes

What makes a job click? Is it the equipment? Yes and No. The equipment may be of the best but unless it is maintained well from the very first day it is put to work there will be breakdowns and delays. The first essential is lubrication which is the essence of good management. To take care of those breakdowns that come inevitably on any job after the machines have begun to work their hardest and carried on for months, Campbell had a Hobart electric welder which itself is seven years old and which has repaired hundreds of breaks in other pieces of equipment without a nickel having been spent on it for repairs. The Assistant Superintendent claimed that the welder had saved several thousand dollars in repair bills to outside shops.

Campbell maintains a Field Office at the job and a General Office at the nearest large town. Both are built on trailers (a description of which will appear in a later issue) with every facility needed for the accurate careful keeping of cost accounts for the job and the ordering of parts and materials.

Personnel

This 12.7-mile concrete paving contract was awarded to A. C. Campbell Construction Co. of Shreveport, La., on its bid of $267,365.71. The job was run under the immediate supervision of A. C. Campbell, principal owner of the outfit, with Joe J. Atchison as Superintendent on Grade and Concrete and E. W. Campbell as Superintendent on Plant and Equipment. For the Arkansas Highway Department, J. H. Tait, Resident Engineer, was in charge of the work.

Concrete handling for Lock No. 24, the last of the locks on the lower Mississippi River, for which the Central Engineering Co. was the contractor, will be described in a feature article in the March issue.

NEW 6" PUMP

Heavy-duty design. Ideal for wellpoint service, bridge pier holes, etc., when large capacity is required.

Compact design. Oil seal eliminating packing. Tremendous capacity—90,000 gph Automatic priming, without handles requiring adjustment. Easy accessibility.

Ask for Bulletin CEM-38

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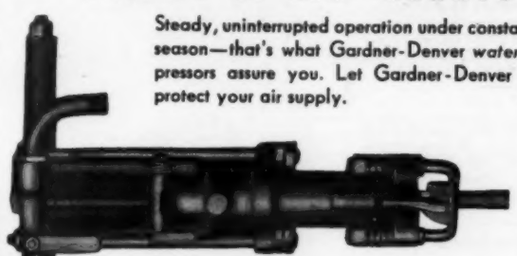
Ridgewood New Jersey

The Open Road TO GREATER PRODUCTION and PROFITS in ROAD BUILDING

PLENTY OF AIR—ALWAYS...

Steady, uninterrupted operation under constant load in any season—that's what Gardner-Denver *water-cooled* Compressors assure you. Let Gardner-Denver better design protect your air supply.



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Gardner-Denver UMB 6-foot change Wagon Drill is a light, mobile unit that steps up your drilling capacity in places where larger equipment cannot operate.

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Bulletins and Pamphlets

For free distribution to contractors, engineers and officials. Write for the catalogs you need.

Asphalt Plants

522 Literature describing Madsen asphalt plants which are built in units for rapid assembly, dismantling and transportation may be secured direct from the Madsen Iron Works, Huntington Park, Calif.

A Power Subgrader

523 The R-B Equipment Mfg. Co., Royal Oak, Mich., will be glad to send to interested contractors complete information on the R-B Power Finegrader for building subgrade accurately and efficiently.

Expansion Hook Bolts

524 Complete information on Chicago expansion hook bolts and hook bolt inserts for fastening new concrete to old may be secured by those interested from the Chicago Expansion Bolt Co., 140 So. Clinton St., Chicago, Ill.

Compressed Air Equipment

525 Worthington compressed air equipment, including portable and semi-portable compressors, rock drills, wagon drills and other pneumatic tools, are described in literature which the Worthington Pump & Machinery Corp., Harrison, N. J., will be glad to send on request.

New Revolving Tractor Scraper

526 The new RC Groundhog revolving tractor scraper which can be converted from full to semi-automatic control in a moment's time is described in an illustrated folder which Farm Tools, Inc., Mansfield, Ohio, will be glad to send on request.

All-Purpose Heavy-Duty Forms

527 Heltzel steel forms for concrete roads, sidewalks, curbs, and curbs and gutters, which can be used interchangeably, are described in Bulletin S-20F, copies of which the Heltzel Steel Form & Iron Co., Warren, Ohio, will be glad to send on request.

A Dragline on Wheels

528 The Michigan high-speed truck-mounted dragline, features of which are full circle load, truck economy, air controls and easy convertibility, is described in Bulletin C which the Michigan Power Shovel Co., Benton Harbor, Mich., will be glad to send on request.

Earth Exploration Meters

529 Earth exploration meters for use on road grading operations in determining the depth of various strata and in soil studies are described in Bulletin 2052-SCE which the American Instrument Co., 8012 Georgia Ave., Silver Spring, Md., will be glad to send.

A New 3½-T Mixer

530 The features of the new Lansing 3½-T concrete mixer, which is fast, rugged and easily portable, are described in the special Lansing Mixer Catalog, copies of which may be secured direct from the Lansing Co., Lansing, Mich.

1938 Bituminous Distributors

531 Bulletin A-1938 issued by Kinney Mfg. Co., 3529 Washington St., Boston, Mass., describes all of the features of the newest Kinney distributors, including air-valve control by one man, a Ford V-8 engine to run the pump, alloy steel tank to reduce weight and other features.

Self-Contained Hydraulic Jacks

532 An informative booklet outlining the features of Blackhawk remote-control and self-contained hydraulic jacks and describing the wide range of their applications may be secured free on request from the Blackhawk Mfg. Co., Dept. CEM, Milwaukee, Wis.

Low-Cost Tractionized Roads

533 Full data on the use and cost of Tarvia for the construction of low-cost tractionized roads may be secured by interested contractors, state and county highway engineers from the Barrett Co., 40 Rector St., New York City.

Line of Arc Welders

534 The Universal Power Corp., 4300 Euclid Ave., Cleveland, Ohio, will be glad to send to interested contractors and engineers complete information on its line of sturdy dependable arc welders.

A New ½-Yard Shovel

535 Copies of the latest catalog containing full details on the new ½-yard Bay City Model 25 shovel recently announced may be secured by those interested direct from Bay City Shovels, Inc., Bay City, Mich.

Vibrated Concrete Patches

536 Complete information on the method of vibrating concrete road patches which enables the road to be opened to traffic in three or four hours may be secured by those interested direct from the International Vibration Co., 16702 Waterloo Road, Cleveland, Ohio.

Handy Light-Weight Pump

537 The M-B Hydroflo for draining manholes, excavations, ditches and similar uses, which weighs less than 40 pounds, is compact and pumps up to 40 gallons a minute, is described in literature which the Meili-Blumberg Corp., Box C-1, New Holstein, Wis., will be glad to send on request.

Tarpaulins for Contractors

538 New tarpaulins proofed against water, rot and mildew may be secured from the Diamond Brand Canvas Products Co., 150 Greene St., New York City, which will also buy used tarpaulins.

Belt Conveyor-Bucket Elevator Book

539 A new 124-page Hand Book on the Stephens-Adamson line of belt conveyors and bucket elevators, containing a large amount of valuable information on belt conveyor design and use as well as descriptions of the equipment with interesting photographs and tables, has recently been issued by the Stephens-Adamson Mfg. Co., Aurora, Ill. Copies of this new Catalog No. 47 may be secured without obligation by writing on your business letterhead and mentioning this magazine.

Aeroil WINTER CONSTRUCTION HEATERS

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SMOKELESS SALAMANDERS
THAWING TORCHES
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A Whale of a Load...

This 62-ft. sperm whale, weighing 65 tons, harpooned off the coast of Southern California by the oldest whaling captain in American service, was transported on two 50-ton capacity trailers from San Pedro harbor for public exhibit at Hollywood.

Texaco Marfak protects parts twice as long as ordinary grease. Its tough, adhesive and cohesive film cushions heavy road shocks, seals out dust, resists washing out by road water.

65 TONS *ON* MARFAK

TRANSPORTING A 65-TON SPERM WHALE is not an every-day occurrence with this trucking company, but when the job comes along, Belyea delivers.

Operating from many yards scattered throughout the State of California, the heavy trucking and trailer equipment of the Belyea Truck Company is kept in service for "dependable delivery," with dependable lubrication. All wheel bearings and chassis parts are lubricated with Texaco Marfak.

Texaco Marfak has the *film strength* to handle the heaviest loads. It is tough, stringy, adhesive . . . clings to metal, seals itself in, seals out road dirt, road water. Try Marfak and be convinced.

Trained lubrication engineers are available for consultation on the selection and application of Texaco Automotive Lubricants. Prompt deliveries assured through 2108 warehouse plants throughout the U. S. The Texas Company, 135 East 42nd Street, N. Y. C.

TEXACO MARFAK

Winter Work on Idaho's Highways

(*Continued from page 12*)

removal from his office, where telephone communications can be established and maintained at all times. Heavy snow units, on roving assignments, in addition to the regular forces, are placed under the direct charge of maintenance superintendents, in order that this equipment may be used where needed and operated independently twenty-four hours of the day throughout periods of stormy weather.

Equipment

The equipment most commonly used consists of four-wheel-drive trucks, of from 3 to 5-ton capacity, moving at high speeds, and equipped with V plows and wings. However, lighter trucks similarly equipped are used effectively on areas where light snow conditions prevail. Tractor equipment is not generally used because of its immobility. Rotary plows are used for widening and cutting through drifts which cannot be opened with a wedge. An effort is made to keep auxiliary equipment available at all times for use in case of emergencies.

The necessity for speed and economy in the removal of snow during general storms has directed attention to the development of fast, powerful, and relatively light equipment. This has been evolved with the idea of removing snow by the velocity at which the plow wings are moved through the snow rather than through mechanical lifting and rehandling. A very simple and adaptable equipment has been developed.

The following is a list of state-owned equipment used in snow removal during the 1936-37 season:

Trucks	169
Displacement plows for trucks	167
Rotary plows for trucks	5
Tractors	10
Displacement plows for tractors	7
Rotary plows for tractors	3
Graders	3
Power shovels	2

Snow Fence

Snow fence, when properly placed. has proved to be an effective method of combating snow. The type most commonly used is the woven lath fence with pickets 4 feet high by 1½ inches wide, spaced 4 inches center to center. A panel-type fence, approximately 10 feet in height, has been used successfully in isolated sections where the low type is of little use. During the winter season of 1936-37, a total of 196 miles of snow fence was used throughout the state.

Miscellaneous Problems

Of late years, considerable thought has been given to the location of highways with respect to prevailing winds and snow condition. However, the earlier roads were constructed with but little consideration to the problems of snow removal which have added materially to the present day cost of winter maintenance.

The damage to oil or bituminous type of surface is proportionate to the character of construction and little damage from the effects of snow removal is evident. Alternate thawing and freezing causes more damage to road surfaces than can be traced to snow or its removal. It is essential that snow be removed from oiled roads as soon as possible, and pushed back clear of the shoulders; where snow is allowed to stand on oiled surfaces and shoulders, the break-up results from an accumulation of moisture. It is the endeavor of snow removal crews to drain thoroughly the traveled-way after each thaw. This is done by means of patrol graders or by hand. The removal of ruts and the cutting of side drains allows the melting snow to drain away, and is necessary for the preservation of road surfaces.

Efforts are always made to remove the snow to the surface of the road which reduces the necessity of ice treatment. However, it often becomes necessary to resort to the use of sand or crushed rock chips. In general, chemicals have not been used by this state in ice treatment. The policy has been to keep the routes in safe driving condition at all times.

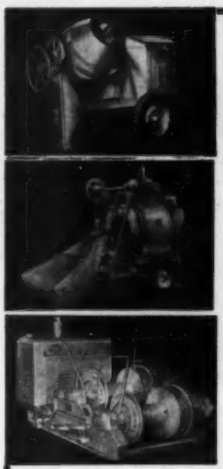
Improper drainage contributes greatly to the probability of a dangerous ice condition, especially during a period of alternate thawing and freezing temperatures during the run-off. The lack of sufficient ditches renders impossible the removal of snow run-off from the traveled way which often forms ice during the night and early morning.

New Split Shaft Power Take-Offs

A complete new line of split-shaft power take-offs which, when installed in any truck, will transmit the full horsepower and torque of the truck motor to any equipment that can be installed on the truck chassis has been announced by the Hercules Steel Products Co., Galion, Ohio.

Various models are included in the line, each in two sizes. Model D-700 is a direct drive unit without gears; Model T-500 is an offset chain-driven unit and Model D-800, a side drive gear-driven unit, from which the power is transmitted to the truck frame.

These power take-offs are designed for operating air compressors, pumps, pile drivers, Crete-Mobiles, rock crushers and similar equipment.



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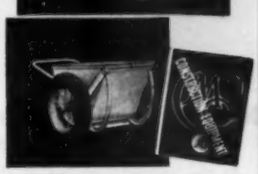

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Model D-50-D
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The Wyoming user of this Littleford No. 101 Utility Sprayer reports: "The No. 101 is used with fine results for patching and seal coating. The patching crew can put in a full day without a return trip to refill; consequently, the large capacity of this Sprayer is a decided advantage. A great deal of shoulder application has been done with the No. 101 which was impossible with our old kettle. For seal coating and shoulder applications, this unit is indispensable. The unit is used the year 'round, even under severe temperatures. Our maintenance foreman does as much work with the No. 101 and a crew of five men as could formerly be done with two crews of four each using old style kettles. Furthermore, the safety feature of the No. 101 rates high with our patrol crew."

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ASSOCIATED EQUIPMENT DISTRIBUTORS
— 19TH ANNUAL CONVENTION —
CLEVELAND, OHIO JANUARY 15, 1938
PHOTO BY CONTRACTORS AND ENGINEERS MONTHLY

New A. E. D. Officers Elected in Cleveland

At the annual meeting of the Associated Equipment Distributors held on January 15 and 16 in Cleveland, Ohio, the following officers were elected: President, A. F. Sersanous, Loggers & Contractors Machinery Co., Portland, Ore.; First Vice President, Victor L. Phillips, Victor L. Phillips Co., Kansas City, Mo.; Second Vice President, R. R. Nixon, Nixon-Hasselle Co., Inc., Chattanooga, Tenn.; Secretary-Treasurer, A. C. Blaisdell, Blaisdell Folz Co., Cincinnati.

One of the high spots of the interesting two-day program was the luncheon to the past presidents of the organization, shown in the accompanying illustration. The past presidents present and seated at the head table were E. D. Townsend, Beckwith Machinery Co., Pittsburgh, Pa.; K. B. Noble, K. B. Noble Co., Hartford, Conn.; M. R. Hunter, Hunter Tractor & Machinery Co., Milwaukee, Wis.; A. C. Blaisdell, Blaisdell Folz Co., Cincinnati, Ohio; H. W. Fletcher, Fletcher Equipment Co., New Orleans, La.; E. R. Bacon, Edward R. Bacon Co., San Francisco, Calif.; C. G. Borchert, Borchert Ingersoll Co., St. Paul, Minn.; A. A. Fuchs, Fuchs Equipment Co., Omaha, Nebr., O. B. Bjorge, Clyde Equipment Co., Portland, Ore.; E. K. Hurst, Western Material Co., Sioux Falls, S. D.; C. E. Baker, Smith Booth Usher Co., Los Angeles, Calif.; F. W. Mattheis, Hedge & Mattheis Co., Boston, Mass.; J. C. Louis, John C. Louis Co., Baltimore, Md.; J. S. Gilman, Wm. H. Ziegler Co., Minneapolis, Minn., and G. F. Lowe, Lowe Machinery Co., Chicago, Ill., the retiring president.

N. H. Underpass

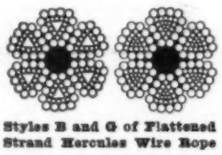
(*Continued from page 35*)

concreting outfit, a 2-bag Koehring Dandie mixer, Johnson wheelbarrow scales, and rubber-tired wheelbarrows for the aggregates. The concrete was usually chuted to place direct from the mixer. Sand and gravel was stockpiled close to the mixer location for the concrete. Prior to each pour in the footings the excavation was unwatered with two Novo diaphragm pumps.

The entire structure was poured with the same class of concrete, Class A of New Hampshire specifications, approximating a 1:2:3½ mix. The actual weights used for this structure were: stone, 315 pounds; sand, 185 pounds; and cement 94 pounds, or one bag.

Personnel

This precast concrete slab underpass located about one mile north of Groveton, N. H., and close to the Ammonoosuc River which empties into the Connecticut River at Groveton, was built by Baker & Forrest of Boston, Mass., under the direction of E. V. Forrest of the partnership. The contract was awarded on the bid of approximately $43,000 and the work was completed with James H. Travis as Resident Engineer for the New Hampshire Highway Department, for which Daniel H. Dickinson is Chief Engineer.



Styles B and G of Flattened Strand Hercules Wire Rope

New Flexible Wire Rope Developed by Leschen

The exhibit of A. Leschen & Sons Rope Co., St. Louis, Mo., at the A.R.B.A. Road Show, featured a complete line of samples of the various constructions of Hercules Red-Strand wire rope for all kinds of road-building equipment, including both standard and preformed styles.

Outstanding was the display of samples of the new G type of flattened-strand construction, which supplements the Style B flattened-strand construction which this company has been furnishing for many years. The G type is somewhat more flexible, and both types offer greater strength, a larger wearing surface, and more compactness than the round-strand hoisting construction in the same size and grade.

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3.4 sq. ft. 3¢ with ropes
proofed against water, rot and mildew
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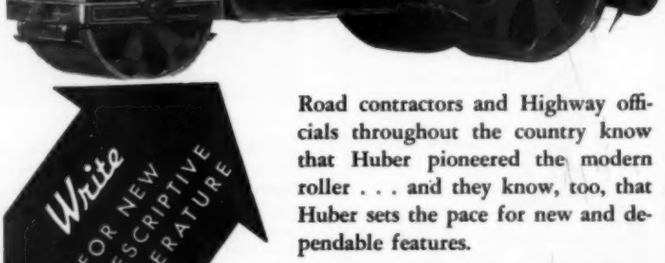

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BUFFALO-SPRINGFIELD Rollers
CLEVELAND Rock Drills
EAGLE Crushers
GAR WOOD (Isaacson) Bulldozers, &c.
KEWANEE Conveyors
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SMITH Mixers
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STERLING Portable Pumps
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MYERS Pumps
KIMBALL-KROGH Centrifugal Pumps
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GWEN—Clamshell Buckets
OMAHA—Dragline Buckets
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A. LESCHEN & SONS—Wire Rope
McKIERNAN-TERRY CORP.—Pile Hammers
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DIAMOND IRON WORKS—Crushers, Portable Gravel Pl.
RAMSEY—Hand and Power Winches
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Sterling Mfg. Co.—Wheelbarrows & Concrete Carts
Sullivan Machy. Co.—Compressors, Pneumatic Tools and Accessories
White Mfg. Co.—Concrete Vibrators, Grinders and Heaters
Member: Associated Equipment Distributors

SOUTHERN OHIO EQUIP. CO

169-171 W. Main St., Zanesville, Ohio

On Route 40

Phone 813

Distributors for

Allis-Chalmers Mfg. Co.	D-A Lubricant Co.
Iowa Mfg. Co.	Shunk Mfg. Co.
General Excavator Co.	Apollo Culvert Works
Schramm, Inc.	Slusser-McLean Co.
Cleveland Rock Drill Co.	Williamsport Wire Rope
Timken Roller Bearing Co.	

SERVICE SUPPLY CORPORATION

20th and Venango Sts., Philadelphia, Pa.

Representing

Bay City Shovels, Inc.—Shovels, Cranes, etc.
Blaw-Knox Co.—Clamshell Buckets
Chain Belt Co.—Mixers, Truck Mixers, Pumpcrete, Pumps, Saw Rigs
Chicago Pneumatic Tool Co.—Compressors, Air Tools
Drave Doyle Co.—Tubular Hoisting Towers
Hercules Company—Road Rollers
Cleaver-Brooks Co.—Concr. Handling Machy., Excavators
Internat'l Harvester Co.—Indus. Wheeltype and Crawler Tractors
C. S. Johnson & Co.—Bins, Batchers, Cement Handl. Eq.
Littleford Bros.—Road Oil Distrs., Heating Kettles, etc.
McKiernan-Terry Corp.—Pile Hammers, Hoists
Nelson Iron Works—Loaders and Belt Conveyors
The Parsons Company—Trench Machines, Snow Plows
W. A. Riddell Corp.—Power Graders
Member: Associated Equipment Distributors

R. B. EVERETT & CO.

3112-18 Harrisburg Blvd. Houston, Texas

BLAW-KNOX Road Plant Equipment, Bins, Clam Shell Buckets	SAUERMAN Cableways
AMERICAN Hoisting Machinery	BATES Wire Ties
"P. & H." Gasoline Cranes	PULSOMETER & NYE Steam Pumps
McKIERNAN-TERRY Pile Hammers, etc.	PATENT Safety Swinging Scaffolding
CONNERY Asphalt Equip.	TRU-LAY Wire Rope
CHAIN BELT Concrete Mixers, Saw Rigs, Pavers	BUFFALO-SPRINGFIELD Road Rollers
HOVO Engines, Hoists, Pumps	SULLIVAN Compressors
"RED STAR" Wheelbarrows	PORTABLE Conveyors
	ETNYRE Asphalt Distrs.
	FLYNN Surgrader
	PAGE Dragline Buckets
	MALL Vibrators

Member: Associated Equipment Distributors

THE SYRACUSE SUPPLY CO.

314 W. Fayette St. Syracuse, N. Y.
Warehouse 358 W. Jefferson St.

Atlas Powder Co.	Insley Mfg. Co.
Blaw-Knox Co.	Parsons Co.
Caterpillar Tractor Co.	Universal Form Clamp Co.
Clyde Sales Co.	Wickwire Spencer Steel Corp.
Goodyear Tire & Rubber Co.	Williamsport Wire Rope
Gorman-Rupp Co.	Timken Roller Bearing Service & Sales Co.—Timken Bits & Rods
Gould's Pumps, Inc.	Iowa Mfg. Co.
Hazard Wire Rope Co.	R. G. LeTourneau, Inc.
Ingersoll-Rand Co.	Master Vibrator Co.
Johns-Manville (Bridge Plank)	Hauck Heaters
Killefer Mfg. Co.	Speeder Machinery Corp.
Koehring Co.	
LaPlant-Choate Mfg. Co.	

Member: Associated Equipment Distributors

CLYDE EQUIPMENT CO.

Contractors' Equipment and Supplies

Portland, Ore. Seattle, Wash.

Atlas Imperial Diesel Eng. Co.	Klauer Mfg. Company
Blaw-Knox & Western Pipe Corp.	T. L. Smith Co.
Clyde Iron Works	Allis-Chalmers Mfg. Co.
Lincoln Electric Co.	LeRoi Company
Buzyrus-Erie Co.	Besbo Bros.
Geo. Haiss Mfg. Co., Inc.	Kohler Co.
Sauerman Brothers	Wm. Bros Boiler & Mfg. Co.
Sullivan Machinery Co.	Smith Engineering Works

Member: Associated Equipment Distributors

J. JACOB SHANNON & COMPANY

1744—Sedgley Avenue—1744
PHILADELPHIA

Representing

T. L. Smith Co.—Concr. Truck Mixers, Pavers, Glass Mixers
Allis-Chalmers Mfg. Co.—Tractors, Graders
C. H. & E. Mfg. Co.—Pumps, Saw Rigs, Boilers, Hoists
Baker Mfg. Co.—Bulldozers Blade & V Type Snow Plows
John A. Roebling's Sons Co.—Wire rope, Fittings
Concrete Surfacing Machinery Co.—Berg Surfacers
Gasgen Derrick Co.—Derricks and Winches
Sehramm, Inc.—Air Compressors, Pneumatic Tools
Clyde Iron Works—Gas, Elec., Steam Hoists
Shannon—Derricks and Derrick Fittings
Iowa Mfg. Co.—Crushers, Conveyors & Asphalt Plants
David Round & Son—Chain Hoists & Winches.
Blaw-Knox Co.—Dirt Movers, Bulldozers, Sheep's Foot Tampers
Gar Wood—Scrapers, Bulldozers
Richmond Screw Anchor Co.—Form ties
Member: Associated Equipment Distributors

PHILLIPS MACHINERY CO.

900 East Cary St. Richmond, Va.

Representing

Austin Machinery Corp.
Butler Bin Company
Clyde Sales Co.
Chicago Automatic Conveyor Co.
DeWalt Products Corp.
Jackson Mfg. Co.
Sauerman Brothers, Inc.
Chicago Pneumatic Tool Co.
Stephens-Adamson Mfg. Co.
Rogers Brothers Corp.
General Excavator Co.
Asroil Burner Co.
Manitowoc Engineering Works
Broderick & Bascom Rope Co.
Chain Belt Company
Van Dorn Electric Tool Co.
Master Vibrator Company
Member: Associated Equipment Distributors

NORTH CAROLINA EQ. CO.

Williamston Raleigh Statesville

Asroil Burner Company	Good Roads Mach. Corp.
American Cable Company	Heltzel Steel Form & Iron Company
Buckeye Traction Ditcher Company	Highway Trailer Co.
Buzyrus-Erie Company	Frank G. Hough Co.
Cleaver-Brooks Company	Internat'l Harvester Co.
Cleveland Rock Drill Co.	Iowa Manufacturing Co.
DeWalt Products Corp.	Jaeger Machine Company
Eagle Crusher Co., Inc.	Jeffery Manufacturing Co.
Elgin Corporation	The C. S. Johnson Co.
Euclid Road Machy. Co.	Konsington Steel Company
Fairbanks, Morse & Co.	Jos. F. Kiesler Company
Fairfield Engrg. Co.	Kinney Manufacturing Co.
Four Wh. Dr. Auto Co.	Northwest Engineering Co.
Galion Allsteel Body Co.	Page Engineering Company
Galion Iron Wks. & Mfg. Co.	Schramm, Inc.

Member: Associated Equipment Distributors

HOWARD-COOPER CORPORATION

Portland — Seattle — Spokane — Twin Falls

Representing

Internat'l Harvester Co. (McCormick-Deering Industrial Tractors)	Buda Co. (Diesel & Gas. Eng.)
Barber-Greene Co.	Baker Mfg. Co.
Cleveland Rock Drill Co.	Walter Motor Truck Co.
Marion Steam Shovel Co.	Sauerage Corp.
Hughes-Keenan Co.	B. F. Goodrich Rubber Co. (Fire Hose)
Cleaver-Brooks Co.	Winslow (Scales)
The Jaeger Machine Co.	Hercules Company
Nordberg Mfg. Co. (Symons Crushers)	Sterling Wheelbarrow Co.
McKiernan-Terry Corp.	Root Spring Scraper Co.
Schramm, Inc. (Compressors)	White Mfg. Co.
Universal Power Shovel Co.	Erie Steel Const. Co.
Speeder Machinery Corp.	J. D. Adams Co.
	Elgin Corp.

Member: Associated Equipment Distributors

WESTERN MATERIAL CO.

Aberdeen, Sioux Falls, Rapid City, S. D.

Anthony Loaders, Tools	Littleford Heating Equip.
Balderson Snow Plows	Manhattan Belting
Barber-Greene Ditchers, Loaders	Pioneer Crushing Plants
Bates Wire Ties	Slusser-McLean Scrapers, Fresnos
Buzyrus-Erie "Loadmaster"	Stoltz Stone Spreaders
Butler Bins, Hoppers	Toro Mowers
Philip Carey Exp. Joints	Walter Motor Trucks
"Caterpillar" Equipment	Willamette-Hyster Winches, Hysters
Chain Belt Pump, Mixers	Athey Wagons
Clyde Sales Hoists	John Deere Indus. Tractors
D-A Lubricants	Killefer Fresnos, Scrapers
Davey Compressors	Coffing Hoists
Day Crushers	Rotary Snow Plows
Harris "Russell" Road Equip.	Highway Trailer Earth Boring Mach.
Hentor Fireline Plows	With Diesel Elec. Pl.
LaPlant-Choate Tractor Eq.	
LeTourneau Dirt-moving Eq.	

Member: Associated Equipment Distributors

PACIFIC HOIST & DERRICK CO.

Machinery and Equipment

3200 4th So. Seattle, Wash

Representing

NORTHWEST—Gas and Electric Shovels, Cranes and Draglines
TWIN DISC—Clutches for all purposes
PAGE—Scraper Buckets, Diesel Draglines
MINNEAPOLIS—"Twin City" Gas Engines
CLIMAX—Gasoline Engines
WISCONSIN—Gasoline Engines
DAKE ENGINE CO.
ISAACSON IRON WORKS—Buckets
CLETRAC—Tractors & Bulldozers
DAVEY—Air Compressors
FEDERAL—Trucks
Member: Associated Equipment Distributors

CAROLINA TRACTOR & EQUIPMENT COMPANY

S. Main Ext. Salisbury, N. Car.

Branch Office and Warehouse:
733-35 West Hargett St.,
Raleigh, N. C.

CATERPILLAR Tractors, Graders, Power Units
THEW Shovels, Cranes
LeTOURNEAU Carry-all Scrapers
BLAW-KNOX Steel Forms, Bins, Buckets, Trukmixers
LaPLANT-CHOATE Wagons, Bulldozers
DIAMOND Roll, Jaw Crushers
BARBER-GREENE Conveyors, Car Unloaders
LaCROSSE Trailers
ETNYRE Bituminous Distributors, Flushers
WONDER Mixers, Pumps, Hoists
GARDNER-DENVER Air Compressors, Drills
SLUSSER-McLEAN Wheelers, Rippers, Fresnos
GORMAN-RUPP Centrifugal Pumps
HERCULES Road Rollers
Member: Associated Equipment Distributors

GASH-STULL CO.

Chester Pennsylvania

Representing

MICHIGAN Power Shovels
UNIVERSAL POWER SHOVEL CORP.
OSGOOD COMPANY
TRACKSON COMPANY
SCHRAMM, INC.
ANTHONY COMPANY
FORDSON Tractors and Equipment

LOCOMOTIVES
HOISTS—SCRAPERS—WIRE ROPE
MANGANESE DIPPER TEETH

NIXON-HASSELLE COMPANY INC.

Contractors' Equipment
Chattanooga Tennessee

Representing

BLAW-KNOX Buckets, Forms	REX Mixers, Pavers, Pumps
INGERSOLL-RAND Compressors, Jackhammers	CLETRAC Tractors
MUNDY Hoists	NEWPORT Culvert Pipe
AUSTIN-WESTERN Graders, Crushers, Rollers, etc.	VULCAN Gasoline Locomotives
BARBER-GREENE Loaders, Conveyors	DOBBIE Derricks
NORTHWEST Cranes, Shovels	HOUGH—"Universal" Road Sweeper
ARCHER Towers, Spouting Equipment	LIDGERWOOD Hoists
	SYNTRON Hammers, Vibr.
	EAGLE Crushers & Pulv.
	FOUR WH. DRIVE Trucks
	TIMKEN Detach. Bits
Also Wheelbarrows, Carts, Benders, Cutters, Shovels, etc.	

Member: Associated Equipment Distributors

CONSTRUCTION EQUIPMENT CO.

1118-1124 Ide Ave., Spokane, Wash.

Asroil Burner Co., Inc.	Iowa Mfg. Co.
American Hoist & Der. Co.	Kalamazoo Ry. Supply Co.
Archer Iron Works	LeRoi Co.
Bates Wire Ties	Linde Air Products Co.
Besbo Bros.	M. & M. Wire Clamp Co.
Blystone Mfg. Co.	Mall Tool Co.
Broderick & Bascom Rope	Niagara Mfg. Co.
Buffalo-Sprgfld. Roller Co.	Red Star Products Co.
Butler Bin Co.	Gasgen Derrick Co.
Chain Belt Co.	Sheldon Mfg. Co.
Climax Eng. Co.	Sterling Machinery Co.
Concrete Surf. Machy. Co.	Sterling Wheelbarrow Co.
D-A Lubricant Co.	Sullivan Machinery Co.
Detroit Graphite Co.	Sunbeam Mfg. Co.
R. E. Dietz Co.	Templeton, Kenly & Co.
Duff-Norton Mfg. Co.	Thew Shovel Co.
Fairbanks, Morse & Co.	Williamette Hyster Co.
Fate-Root-Heath Co.	"Williams" Buckets, etc.
Homestead Valve Mfg. Co.	Young Iron Works

Member: Associated Equipment Distributors

THE CLETRAC OHIO SALES CO.

E. 193rd Street and Euclid Ave.
Cleveland Ohio

Representing

THE CLEVELAND TRACTOR CO.—Crawler Tractors
THE DAVEY COMPRESSOR CO.—Air-Cooled Compressors
THE EUCLID ROAD MACHY. CO.—Crawler Wagons, Scrapers, Bulldozers
THE ISAACSON IRON WORKS—Power Scrapers, Trailbuilders
MAIN STEEL PRODUCTS CO.—Snow Plows
MEAD MORRISON—Winches
THE TRUCK ENGINEERING CORP.
D-A LUBRICANT CO.—Oil

EDELEN & BOYER COMPANY

Office and Warehouse **Philadelphia**
236 North 23rd St. **Penna.**

Distributors of

General Shovels, Cranes	Hayward Clamshell Buckets
Multi Foote Pavers	Huber Rollers
Adnun Black Top Pavers	Archer Towers, Buckets
Heltzel Steel Forms, Bins	LaCrosse Tu-way Trailers
R-B Finegrader	Burch Stone Spreaders
Heltzel Finishing Mach.	Gasgen Derricks, etc.
Marsh Capron Mixers	Flory Hoists
Wonder Concrete Mixers	R-B Power Subgrader
Marlow Centrifugal Pumps	Miles Block Machines
Marlow Diaphragm Pumps	Pulsometer Steam Pumps
Chrysler Portable Air Compressors	Bay City Truck Cranes
New Haven Burlapped-Cotton Blankets	Tru-Lay Steel Cable
	Reynolds Constr. Furnaces
	Jaakson Wheelbarrows, etc.

BROOKS EQUIP. & MFG. CO.

Knoxville 406 Davenport Rd. Tennessee

Representing

J. D. Adams Co.	Hug Co.
Buzyrus-Erie Co.	Independent Pneu. Tool Co.
Continental Roll & Steel Co.	Jaeger Machine Co.
Crucible Steel Co.	C. S. Johnson Co.
Drave-Doyle Co.	Linn Mfg. Corp.
Foote Co., Inc.	Master Vibrator Co.
Gardner-Denver Co.	McKiernan-Terry Corp.
Heltzel Steel Form & Iron Co.	Owen Bucket Co.
	Pioneer Gravel Eq. Mfg. Co.
Cincinnati Rubber Mfg. Co.	Reeco Mfg. Co.

Member: Associated Equipment Distributors

BOEHCK EQUIPMENT CO.

2404 W. Clybourn St. Milwaukee, Wis.

Representing

Jaeger Machine Co.	American Hoist & Derrick Co.
Byers Machine Co.	Jones-Superior Machine Co.
LaMot Co.	Construction Accessories, Inc.
A. Leschen & Sons Rope Co.	Independent Pneumatic Tool Co.
Wellman Engineering Co.	Hercules St. Products Co.
C. S. Johnson Company	Electric Tam. & Equip. Co.
Corrugated Steel Sheet Piling Corp.	Portable Machinery Company
McKiernan-Terry Corp.	Hauck Mfg. Company
Homestead Valve Mfg. Co.	Lima Locomotive Works
Gasgen Derrick Co.	Red Star Products, Inc.

Member: Associated Equipment Distributors

LOOK THIS DIRECTORY OVER CAREFULLY

If you find any errors while checking over this directory will you please advise us, because it is our desire to keep it accurate and up to date at all times.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue New York

GILES & RANSOME

17th St. & Sedgley Ave., Philadelphia

"Caterpillar"—Tractors and Road Machinery
Ransome Concrete Machinery Co.—Concrete Mixers and Appliances
Northwest Engineering Co.—Gasoline Cranes and Shovels
Blaw-Knox Co.—Clamshell Buckets, Steel Buildings, Steel Bins
Ord—Road Finishing Machine
R. G. LeTourneau, Inc.—Carryalls, Buggies
The Barnes Mfg. Co.—Centrifugal Diaphragm and Force Pumps
Athey Truss Wheel Co.—Crawler Wagons
Schramm—Air Compressors
Richmond Screw Anchor Co.—Concrete specialties
Master—Elec., Gas. Concrete Vibrators
Member: Associated Equipment Distributors

WILSON-WEESNER-WILKINSON CO.

Nashville Tennessee

Representing

Koehring Co.	McKiernan-Terry Corp.
Insley Mfg. Co.	Smith Engineering Works
Allis-Chalmers Mfg. Co.	Amos Baldwin Wyoming Co.
Blaw-Knox Co.	Baker Mfg. Co.
Gorman-Rupp Co.	Cleaver-Brooks Co.
The Parsons Co.	Clyde Sales Co.
Ingersoll-Rand Co.	E. D. Etnyre Co., Inc.
Littleford Bros.	

NASHVILLE—KNOXVILLE
Warehouse Stocks of Service
Reinforcing Steel and Mesh
Member: Associated Equipment Distributors

DROTT TRACTOR CO., Inc.

3841 W. Wisconsin Ave.
Milwaukee Wisconsin

Representing

ALLIS-CHALMERS Tractors, Graders, Speed Patrols, Hauling and Power Units	KOB Sand Spreaders
	HERCULES Road Rollers
OSHKOSH 4-wheel Drive Trucks	DAVEY Air Compressors
PIONEER Gravel Equipment	RUSSELL Scrapers, Plows
WAUSAU Snow Plows	CONTINENTAL Dirt-Moving Scrapers
DROTT Bulldozers, Scrapers, Scarifiers, Hydraulic Equipment, etc.	HOUGH Loders, Sweepers
	CUMMINS Diesel Engines
LaCROSSE Trailers	JOY Snow Loaders
	BUTLER Sand Spreaders
	WILLET Truck-Grader
	GAR WOOD Dirt Moving Scrapers

Member: Associated Equipment Distributors

W. T. WALSH EQUIPMENT CO.

3088 West 106th St., Cleveland, Ohio. Tel. Clearwater 4400

Allis-Chalmers—Tractors	The C. S. Johnson Co.
Anthony—Dump Bodies	McKiernan-Terry Corp.—Pile Hammers
Baker Mfg. Co.—Bulldozers	Michigan—Power Shovels
Broderick & Bascom—Wire Rope	Novo Engine Co.—Engines, Light Plants, Pumps
Wm. Bros Mfg. Co.—Tamping Rollers	R-B Equipment Co.—Finegraders
Cleveland Rock Drill Co.—Air Tools	Rome Mfg. Co.—Distributors & Oilers
Construction Machy. Co.—Mixers	Schramm, Inc.—Air Compressors
Continental—Scrapers	Timkin—Bits
Foote Company—Pavers	Wellman Engineering Co.—"Williams" Buckets
Gar Wood—Scrapers	White Mfg. Co.—Asphalt Plants, Tar Kettles, Kerosene Torches, Vibrators
General Excavator Co.—Shovels	
Hough—Loaders	
Iowa Mfg. Co.—Crushers	

Member: Associated Equipment Distributors

HOWARD W. READ CORP.

800 N. Delaware Ave., Philadelphia, Pa.

Distributors

Koehring Co.	Wm. Bros Boiler & Mfg. Co.
Ingersoll-Rand Co.	Galion Iron Works & Mfg. Co.
Pomona Pump Co.	Metal Forms Co.
Gorman-Rupp Co.	Quick-Way Truck Shovel Mfg. Co.
Iowa Mfg. Co.	Insley Mfg. Co.

Also Carry in Stock:

Hoisting Engines, Gas and Steam
Pile Driving Hammers
Truck Cranes

BROWNING-FERRIS MACHY. CO.

205 Exposition Ave. Dallas, Texas
Texas at Rice Sts. Houston, Texas

Representing

Buckeye Traction Ditcher Company
Foote Company—Pavers
Galion Iron Works & Mfg. Co.
Ingersoll-Rand Company
International Tractors
Iowa Mfg. Co.—Cedar Rapids Line
Jaeger Machine Company
Jones Superior Mach. Co.
Lidgerwood Mfg. Co.
Littleford Brothers
The Owen Bucket Company
Sterling Wheelbarrow Co.
Thew Shovel Company
Trackson Company
Page Engineering Co.
Member: Associated Equipment Distributors

HUNTER TRACTOR & MACHY. CO.

Phone: Orchard-6580

327 So. 16th St. Milwaukee, Wis.

Representing

Asroil Burner Co.	Pulsometer Steam Pump Co.
American Steel & Wire Co.	R. B. Mfg. Co.
Archer Iron Works	Gasgen Derrick Co.
Atlas Conveyor Co.	Sauerman Bros.
Bates Wire Ties	Sterling Wheelbarrow Co.
Blaw-Knox Co.	Sullivan Machy. Co.
Buffalo-Springfield Co.	Syntron Co.
Burch Corp.	Toledo Pressed Steel Co.
Chain Belt Co.	Universal Form Clamp Co.
Clyde Iron Works	Winslow Son't St. Scale Wks.
Euclid Road Machy. Co.	Northwest Engineering Co.
Iowa Mfg. Co.	Kelley Electric Machine Co.
Master Vibrator Co.	
McKiernan-Terry Corp.	

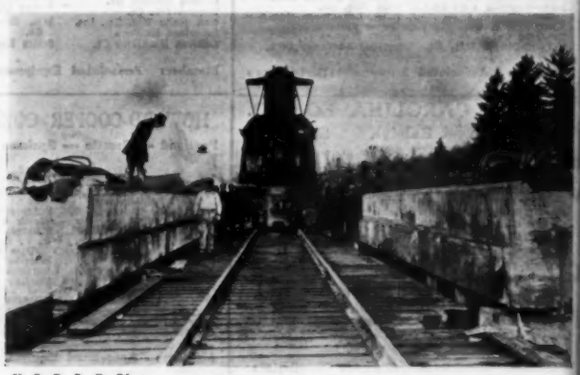
Member: Associated Equipment Distributors

Contractors and Engineers Monthly

C. & E. M. Photos

These Signs Figured Prominently in Ripley's "Believe It or Not," as the Birmingham, Ala., Industrial Water Supply Project Is the Only One Where PWA and WPA Signs Appear on the Same Project. It Should Be Noted, However, That the Contractor's Sign Was Erected Between the Two. Below, at Left, the Beginning of the Rock-Fill Dam at Inland, Ala., Showing Clearly the Three Size Grades of Rock Used. See Page 2.

C. & E. M. Photo



U. S. B. P. R. Photo

The Half-Way Point in the Setting of the 108-Ton Precast Slabs for the Groveton, N. H., Underpass. See Page 21.

Left, The South Portal of Arch Cape Tunnel on the Oregon Coast Highway, Showing the Core Ready to Be Removed After the Drifts Were Completed. See Page 27.

Right, Timbering in the First 100 Feet of the 1,800-Foot Arch Cape Tunnel and the Jumbo Ready for Use When Solid Rock Was Encountered.

Three Lorain Shovels Working on the 100,000-Yard Excavation for the Foundation of the New State Finance Building in Harrisburg, Pa.

Left, a Cataract of Snow Created by a Snogo As It Flows Its Way Across a High Steel Bridge on U. S. Highway 91 Near Spencer, Idaho. See Page 12.

Right, a Highway Cleared for Traffic Through a Series of Drifts in Heavily Wooded Country Between Moscow and Potlatch, Idaho, on U. S. Route 95.

Interest in American Road-Building Equipment Is International. A Portion of the Heavy Machinery Exhibited at the A. R. B. A. Five-Star Road Show in Cleveland, the Largest Ever Held, and in the Inset, the Exhibit of American-Designed Equipment Manufactured in England by John Allen & Sons Ltd. at the Roads and Transport Exhibition in London Last Fall, the Largest and Most Successful Ever Held There. See Pages 6 and 23.